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George A. Simpson

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INTERNATIONAL CLINICS

A QUARTERLY

OF

CLINICAL LECTURES AND ESPECIALLY
PREPARED ARTICLES

ON

MEDICINE, NEUROLOGY, SURGERY, THERAPEUTICS, OB-
STETRICS, PÆDIATRICS, PATHOLOGY, DERMATOLOGY,
DISEASES OF THE EYE, EAR, NOSE, AND THROAT,
AND OTHER TOPICS OF INTEREST TO
STUDENTS AND PRACTITIONERS

BY LEADING MEMBERS OF THE MEDICAL PROFESSION
THROUGHOUT THE WORLD

EDITED BY

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CONTENTS OF VOLUME III.

(ELEVENTH SERIES.)

THERAPEUTICS.

	PAGE
PHOTOTHERAPY AFTER FINSSEN'S METHODS. By VALDEMAR BIE, M.D.	1
ANTITOXIC SERA: THEIR PREPARATION AND STANDARDISA- TION. By J. W. H. EYRE, M.D., F.R.S. Edin.....	23
CLINICAL ASPECTS OF SPA TREATMENT. By BEVERLEY ROBINSON, M.D.	32
THE INFLUENCE OF PREGNANCY ON THE PROGNOSIS AND TREAT- MENT OF COEXISTING ACUTE AND CHRONIC DISEASES. By AMAND ROUTH, M.D. (Lond.), F.R.C.P. (Lond.).....	41
GONORRHOEA AND MARRIAGE. By PROFESSOR LOUIS JULLIEN.....	58
ON THE DRAWBACKS TO THE SPINAL USE OF COCAINE AND THE ACCIDENTS DUE TO IT. By PAUL RECLUS, M.D.....	71
THE SELECTION OF FAVORABLE CASES OF PULMONARY TUBER- CULOSIS FOR SANATORIUM TREATMENT. By E. R. BALDWIN, M.D.	78
REMARKS ON THE TREATMENT OF BLEEDERS. By WILLIAM HENRY BATTLE, F.R.C.S. (Eng.).....	82

MEDICINE.

CONVULSIONS IN INFANTS AND CHILDREN UNDER THREE YEARS OF AGE. By JOHN ABERCROMBIE, M.D. (Cantab.), F.R.C.P. (Lond.)..	90
A CASE OF COMBINED ECHINOCOCCUS DISEASE AND TUBERCU- LOSIS. By CHARLES F. WITHERINGTON, M.D.....	95
THE PROPHYLAXIS AND EARLY DIAGNOSIS OF HEART DISEASE; PALPITATION AND ORGANIC DISEASE; TOBACCO AND HEART LESIONS; CURE OF HEART LESIONS. By JAMES J. WALSH, M.D., Ph.D.....	100
A CASE OF EXOPHTHALMIC GOITRE. By ALEXANDER JAMES, M.D..	112
CARDIAC DISEASE (PANCARDITIS) DUE TO LEAD POISONING; SYPHILIS OF THE THROAT; PHANTOM TUMOR OF THE AB- DOMEN IN A MALE. By SOLOMON SOLIS-COHEN, M.D.....	121
CLINICAL TREATMENT OF INEBRIETY. By T. D. CROTHERS, M.D...	132

NEUROLOGY.

	PAGE
AREAS OF SOFTENING IN BOTH CEREBRAL HEMISPHERES. By PROFESSOR ARNOLD PICK.....	149
HEREDITARY CEREBELLAR ATAXIA; NOCTURNAL EPILEPSY. By D. R. BROWER, M.D., LL.D.....	158
THE LOCALIZATION OF NERVOUS LESIONS. By ALFRED WIENER, M.D.	164
CEREBELLAR DEGENERATION DUE TO INTESTINAL INTOXICATION. By AUGUSTO MURRI, M.D.....	177

SURGERY.

POINTS IN THE DIAGNOSIS AND SURGERY OF LESIONS OF THE CONUS TERMINALIS AND THE CAUDA EQUINA. By PROFESSOR DEMETRIUS RONCALI	191
SOME ACUTE AFFECTIONS OF THE GALL-BLADDER AND ITS ASSOCIATED DUCTS. By HOWARD LILIENTHAL, M.D.....	203
SOME RESULTS OF MICROBIC INFECTION IN URINARY DISEASE. By HERBERT T. HERRING, M.B., B.S.....	215
PROGNOSIS IN APPENDICITIS. By A. H. TUBBY, M.S. (Lond.), F.R.C.S. (Eng.)	220
SELECTED CASES OF APPENDICITIS. By JOHN B. DEEVER, M.D....	224
SURGICAL TREATMENT OF APPENDICITIS. By A. ROUTIER, M.D....	239
DOUBLE NEPHROPEXY AND INVERSION OF THE VERMIFORM APPENDIX. By GEORGE M. EDEBOHLS, A.M., M.D.....	250
SOME INTERESTING SURGICAL CASES. By PATRICK J. FAGAN, F.R.C.S.I.	263
ACUTE SUPPURATIVE MASTOIDITIS; INGUINAL HERNIA, VARICOCELE, AMPUTATION OF THE SCROTUM; SOME OF THE SEQUELÆ OF THE TREATMENT OF STRICTURE OF THE URETHRA BY RAPID DILATATION. By ALEXANDER B. JOHNSON, M.D.	268
STRANGULATED AND GANGRENOUS HERNIA; PRIMARY RESECTION OF THE INTESTINE BY MODIFIED CONNELL METHOD IN CIRCULAR ENTERORRHAPHY OR JOINTING OF THE ENDS. By THOMAS H. MANLEY, M.D., Ph.D.....	274

DISEASES OF THE EYE AND THROAT.

DIFFERENTIAL DIAGNOSIS BETWEEN PTOSIS AND ORBICULAR SPASM AND BETWEEN PARALYTIC PTOSIS AND HYSTERICAL PTOSIS. By EDMUND LANDOLT.....	284
SOME OF THE MORE COMMON DISEASES OF THE TONSILS, WITH THEIR SURGICAL TREATMENT. By W. CHEATHAM, M.D.....	286

LABORATORY METHODS.

THE CLINICAL LABORATORY IN PRIVATE PRACTICE AND IN THE PHYSICIAN'S OFFICE. By C. N. B. CAMAC, M.D.....	289
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LIST OF ILLUSTRATIONS TO VOLUME III.

(ELEVENTH SERIES.)

PLATES.

	PAGE
Apparatus for concentrating sunlight (Fig. 1).....	9
Treatment with concentrated sunlight (Fig. 5).....	12
Treatment with electric-arc light (Fig. 6).....	13
Cases I.-VIII. before and after treatment by phototherapy (Figs. 7-22) ..	17-22
Areas of softening in the temporal and occipital lobes (Fig. 1); areas of softening involving the cuneus and the temporal and occipital lobes (left side) (Fig. 2).....	155
Right hemisphere of brain in which the cuneus and the convolutions just below are alone affected (Fig. 3); section of hemisphere corresponding with line 4 in Fig. 1 (Fig. 4).....	156
Sections of one hemisphere of brain (Figs. 5, 6, 7).....	157
Three successive sections of a cerebellar convolution, showing diminution in the number of the cells of Purkinje (Figs. 1, 2, 3).....	185
A slightly magnified cerebellar convolution corresponding to a cerebellar sulcus, cells of Purkinje lessened in number (Fig. 4); cells of Purkinje in various states of degeneration (Fig. 5).....	186
Gall-bladder laid open, showing two large stones <i>in situ</i> (Fig. 1); gall-bladder which contained numerous small faceted stones (Fig. 2)....	212
Modified Connell operation for strangulated hernia: oblique divisions of intestine, compression bands tied, lateral openings for joint, patches of gangrene (Fig. 4); section of gangrenous loop, long sloping incisions through sound tissue (Fig. 5); lateral anastomosis of intestine, lower row of sutures in position (Fig. 6); anastomosis complete (Fig. 7)	278-281

FIGURES.

Apparatus for concentrating electric light (Fig. 2).....	9
Electric-arc light with four concentrating apparatuses (Fig. 3).....	10
Compressor for the skin (Fig. 4).....	11
Diagrams showing the locations of ulcerative scars resulting from lesions of the conus terminalis and cauda equina, anterior and posterior views (Figs. 1, 2)	195

	PAGE
Areas of disturbed sensation (anæsthesia and hyperæsthesia) (Figs. 3, 4)	198
Simple ligation of appendix; stump free in peritoneal cavity (Fig. 1); ligation of appendix with depression of stump; stump bottled in a recess of peritoneal cavity (Fig. 2); inversion of stump of appendix without ligation; peritoneal mouth closed by suture (Fig. 3); inver- sion of entire appendix; peritoneal mouth closed by suture (Fig. 4) ..	256
Modified Connell operation for strangulated hernia: delivery of intestine showing gangrenous ring (Fig. 1); enterorrhaphy, purse-string and Lembert sutures (Fig. 2); deformed overdistended coils, extreme ste- nosis at ring, etc. (Fig. 3)	276-278
Ileocaecal lateral anastomosis; closed ends of ileum (Fig. 8)	281

Therapeutics

PHOTOTHERAPY AFTER FINSEN'S METHODS.

AN ARTICLE PREPARED BY REQUEST OF DR. FINSEN, WHO HAS JUST RECEIVED THE NOBLE PRIZE OF FIFTY THOUSAND DOLLARS FOR HIS VALUABLE SERVICES TO THE MEDICAL SCIENCES.

BY VALDEMAR BIE, M.D.,

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THE person who occupies himself with the biological effects of light and its therapeutic employment must, first of all, remember that light is not a simple entity, but that every ray consists of a series of distinct parts, each of which has its determined properties, and that the different illuminating lights themselves vary in composition. The last-named fact is shown in the following table, which I have taken from "The Chemical Action of Light," by Eder. The strength of light at the line D of the Fraunhofer scale is placed at 100.

	C, red.	D, yellow.	b.	F, green to blue.	Standard candle-light, which is the unit of normal light.
Normal light	73	100	104	134	1
Gas-light	74	100	103	125	16
Calcium-light . . .	59	100	113	285	90
Electric light	61	100	121	735	362
Magnesium-light . .	50	100	223	1129	215
Moonlight	87	100	155	363	204
Sunlight	45	100	250	2971	70000

The effects of the solar spectrum may be arranged in three different groups,—heat, light, and chemical action. The highest temperature is found in the ultra-red, red, and orange-colored part of the spectrum, the yellow and green rays make the strongest impres-

sion of light on the human retina, and the strongest chemical action is found in the region of the blue, violet, and ultra-violet rays. If the practitioner does not at the start perceive clearly which one of these principal properties of light he should use for therapeutic purposes, he will work entirely in the dark. To insure a firm experimental foundation, therefore, for the therapy of light, it is necessary to investigate the biological effects of the different constituents of light and the spectral composition of the various kinds of light.

It is Professor Finsen's great merit, first of all, to have taken into the service of therapeutics the so-called chemical or actinic rays. I shall not now enter farther into his scientific labors, but confine myself to a review of the experimental foundation upon which he has based his therapy, together with the technique and its results.

Besides the effects of light on the eyes, the numerous investigations of the biological influence of light have securely established two facts,—the power of light to cause inflammation of the skin and its efficiency in destroying bacteria. Many other effects of light have apparently been discovered, but none of them have been fully confirmed. The two facts mentioned are, on the contrary, so certain that Finsen's therapy, which is based exclusively upon them, has an absolutely trustworthy experimental foundation.

The inflammation arising in the skin, *erythema solare*, was formerly called erythema caloricum, because it was thought to be due to overheating of the integument. But as early as 1859 Charcot wrote that this conception of the origin of the erythema was erroneous, and it was entirely refuted later. Its correctness might have seemed doubtful even then, since it was observed that severe erythemata might arise while travelling among ice-fields, upon the tops of high mountains, in polar regions, and in other places where the temperature is much below zero, and, similarly, by remaining in the vicinity of an electric arc-light, where only a faint heat from the rays can be felt.

Widmark, of Stockholm, has determined, by the following experiment, that the inflammation of the skin is not brought on by the heat rays, but by the rays with the greatest refrangibility. With a lens of rock crystal he caused the rays emitted by an electric arc light of twelve hundred candle-power to become parallel. This

lens was placed in one end of a tube; the other end was closed by a plain glass plate, having a hole in its middle in which was inserted a plate of rock crystal. Glass absorbs most of the ultra-violet rays of the electric light, but rock crystal allows them to pass through. The tube could be filled with distilled water, which absorbs the ultra-red rays. It was shown that the effect was the same whether the light passed through the distilled water or not: the inflammation was, therefore, independent of the heat rays. On the contrary, it was found that the light transmitted by the glass ring did not bring on any inflammation, while that which passed through only the rock crystal produced severe inflammation.

Widmark's result was corroborated by Finsen's researches. He allowed solar light which was concentrated by lenses of rock crystal to fall on his arm. Burning was avoided, partly by depriving the light of its ultra-red rays by passing it through a stratum of distilled water included between rock-crystal lenses and partly by pouring cold water on the arm. The various parts of the spectrum were successively passed through rock crystal alone or through this and also a colorless, blue, green, orange, or red glass plate. Although concentrated light was used, the red, yellow, and green rays never brought on any inflammation; the blue and violet rays, on the contrary, had this effect, which, however, was much weaker when they were used alone than when their influence was enhanced by the addition of the ultra-violet rays.

Since Widmark's and Finsen's experiments, it is, therefore, indubitable that the power of light to bring on inflammations of the skin depends principally upon the ultra-violet rays, less upon the violet and blue, and not at all upon the green, yellow, red, and ultra-red.

This fact may be utilized therapeutically. In cases where the skin of the face was so susceptible to the injurious influence of light that an eruption occurred in those parts which were exposed to the sunshine in spring and summer, Unna, Veisl, and Held have contended with the heightened sensibility by directing their patients to wear red or yellow veils. In various other skin diseases also which are dependent on the injurious action of light on the skin, this "negative phototherapy" is often employed. Hammer has shown that rubbing a solution of quinine into the skin hinders the appearance of the inflammation, manifestly because the solu-

tion changes the ultra-violet rays into those which are less refrangible and hence less injurious to the skin.

The most important practical use of the results of Finsen's and Widmark's above-mentioned experiments is, however, Finsen's revival of the forgotten treatment of various infectious exanthemata—for instance, smallpox—by the exclusion of the chemical rays of light. Professor Finsen believed that, if the chemical rays are able to bring on an inflammation in the healthy skin, they may also make worse an inflammation already existing. Consequently, by excluding these rays, one may diminish the intensity of the inflammation,—that is, in smallpox, may prevent suppuration. This view is supported by the fact that the deepest eruptions and the most closely clinging scabs are found on the face and hands, which are the parts of the body most exposed to light. This shows that the skin suffers from the injurious influence of the actinic rays. The patients might be allowed to lie in the dark, but as regards their subjective well-being it is preferable to let them lie in the red light, which is not harmful to the skin.

The arrangement of "the red room" is very simple: it is similar to that of the dark chamber in photography. One may either use spectroscopically clear dark-red glass for the window-panes, or hang red curtains—*e.g.*, of shirting—before the windows; these should be sufficiently thick and close in texture to exclude all light except the monochromatic red rays. Or one may darken the windows with a stuff which is wholly impermeable and light the chamber artificially with a feeble red illuminant, as in the photographic dark room. In both cases, naturally, the openings of the fireplaces should be covered, so that the actinic rays may not reach the patient from them.

No injury to the patient's health from the red rays has ever been observed; on the contrary, patients often express a desire to be brought into the red room.

About one hundred and fifty cases of smallpox treated by this method have been published; many of these patients had never been vaccinated. All the physicians who have given their experience with it declare that the results were remarkable. If the patients are brought into the red light before the beginning of the suppurative stage, as a rule, there is no suppuration. The vesicles continue clear and after several days dry to crusts, which later fall

off without leaving a scar. Many patients had very severe exanthemata with confluent vesicles.

The sooner patients are brought into the red light the more surely a favorable result is obtained. Whether the treatment will also benefit cases in which suppuration has already appeared cannot be decided by the aid of the data at hand. At any rate, Dr. Abel, of Bergen, who has tried the method, reports that he soon perceived a favorable influence on a patient in whom suppuration was fully developed before the beginning of the treatment; on the day after the patient was brought into the red light the fever had abated and there was much less irritation around the pustules.

Under this treatment there is also not so much inflammation of the skin between the vesicles; œdema does not generally appear, and, when it does, it is comparatively insignificant.

That the non-appearance of suppuration is of the highest importance is self-evident. The course of the disease is greatly changed. All the symptoms which are dependent on suppuration are absent. When the fever accompanying the eruption has disappeared, the temperature remains about normal, instead of rising again in the stage of suppuration. In most cases no scars are formed; in the worst cases there may be a few, but they are so small as to be almost invisible. The duration of the disease is shortened, and the mortality sensibly lessened. Of the patients who entered into the red light before the beginning of the suppuration, but few died, and all these were suffering from one of the very severe forms of variola which is almost always fatal. That such patients die is no fault of Finsen's method, for no one has ever claimed that it could successfully combat the infection of smallpox, but only that it is a valuable local treatment of the variculous exanthema.

Dr. Svendsen, of Bergen, and Professor Fejlberg, of Copenhagen, have instituted some interesting control researches, which clearly prove that light can change a vesicle into a pustule. Dr. Svendsen allowed two of his patients to go out into the daylight after the vesicles of the face were fully dried, while on the back of the hands there were yet vesicles which had not dried; when the patients came out into the light, these vesicles began to suppurate and left scars behind, while no scars were found elsewhere. One of Dr. Fejlberg's patients was exposed to daylight while there were

still some vesicles not yet dried on the ear; these suppurated. In an unvaccinated child who had confluent smallpox vesicles the treatment was not begun until suppuration had occurred on the face, where it was severe and left numerous scars. On the hands, where suppuration often develops later than on the face, it did not appear, and the vesicles dried without leaving any scar.

In the last two years Finsen's red-light treatment has also been tried in various other infectious exanthemata; *e.g.*, Backmann (Viborg, Finland) and Chatinière have obtained especially satisfactory results with it in the treatment of measles. A trial of this method in the treatment of scarlatina and erysipelas also would be of much interest.

Besides the above-described therapeutic method, which excludes the chemical rays of light in cases where they would be injurious, Finsen has employed the actinic rays as directly curative agents,—"positive phototherapy." This is the so-called treatment with concentrated chemical light-rays. It is used in local bacterial diseases of the skin, and is based on the bactericidal power of light. In the treatment of some diseases also the power of light to bring on inflammation in the skin receives attention.

That light can kill bacteria has been shown by many trustworthy experiments, but there has been much controversy as to what kind of rays produced such effect. This question has evidently extraordinary significance in view of the fact that the therapeutic use of light depends upon it. A series of researches which I have carried out in "Finsen's Medical Light Institute" at Copenhagen supports the conclusion arrived at by the earlier investigators, that the bactericidal effect is due to the chemical rays. Owing to the superior facilities given me at the institute, I could undertake not only a qualitative but also a quantitative investigation, which showed that the bactericidal power of light resides almost exclusively in the blue, violet, and ultra-violet rays, and only a small percentage of such potency exists in the red, yellow, and green. Similarly I showed that the ultra-violet rays possess a very strong bactericidal action. The rays of light which kill bacteria are, therefore, the same as those which bring on inflammation in the skin. Hence it follows that the light which is used in this method of treatment should contain the greatest possible number of blue, violet, and ultra-violet rays, while all other rays are indifferent.

For therapeutic use the light must be strong enough to kill bacteria in a short time. Even in thin plate cultures bacteria endure powerful sunlight and electric-arc light so long that there can be no thought of using either of them in this treatment. Finsen found, for example, that at Copenhagen clear sunlight at midday in July and August first destroyed bacteria after about one and one-half hours' action. When a plate culture in a Nielsen's flask was placed seventy-five centimetres from an electric-arc light of twenty-five ampères (about four thousand candle-power), at right angles to the most intense part of it, the bacteria were killed by eight or nine hours' illumination. When it is remembered that much of the light is intercepted in its passage through the skin, it is self-evident that there can be no thought of using therapeutically light of such intensity. Finsen has, therefore, from the first used only concentrated light. Since the heat also increases with concentration, he sought at the same time to cool the light so that burning of the skin should not result. By concentrating the light in such a manner that it contains the greatest possible number of blue, violet, and ultra-violet rays, Finsen has with the electric light, which is used in the treatment of patients, killed various common kinds of bacteria in thin plate cultures in the course of a few seconds. Since the bactericidal action of concentrated sunlight depends wholly on its momentary intensity, there is no absolute measure for it.

In his first clinical experiment Finsen brought on hyperæmia in the place which was treated. Investigation has shown that the bacteria are killed most quickly in the presence of an abundance of carbonic acid gas. Finsen assumed, therefore, that an excess of this gas in the blood might be favorable. Godneff's researches show that the actinic rays may pass through the skin filled with blood. With the aid of a trocar Godneff placed small glass tubes containing chloride of silver under the skin of dogs and cats. He kept some of these animals in the dark and others in direct sunlight. After an hour he took out the tubes, and found that the chloride of silver was blackened in all the animals which had stayed in the light, but not in those which had been in the dark.

Finsen subsequently became convinced that, instead of causing hyperæmia, the aim should be to keep the skin ischæmic at the place to be treated. He showed this by the following experiment: He placed a piece of photographic paper on one side of a human ear

and illuminated the other side of the ear with the blue-violet light from one of the concentrating apparatuses which are used in the treatment of patients with sunlight; five minutes later the paper was not affected. Finsen then pressed the ear bloodless between two glass plates and again illuminated it in the same manner; the paper was now distinctly colored after twenty seconds' exposure. The result of this experiment agreed well with the spectroscopic relation. That is, when a somewhat thin ear is observed through a spectroscope only a red streak is seen; but if the ear be pressed bloodless, the spectrum will contain all colors. As the blood, therefore, absorbs the bactericidal actinic rays, it is necessary in treatment to make the skin as bloodless as possible so that the rays may penetrate it and kill the bacteria therein.

The demands on the technique of this method of treatment are, consequently, the following: the light used must be the strongest obtainable and must contain the greatest possible number of blue, violet, and ultra-violet rays and a minimum of heat rays, to avoid burning; the part of the skin illuminated must also be rendered ischæmic. How Finsen has by degrees brought the technique into agreement with these requirements will be shown in the following.

In the summer sunlight is used if the weather be clear, otherwise electric-arc lights of from fifty to eighty ampères and about fifty volts. Electric-arc lights are the only serviceable substitute for sunlight; they are indeed superior to it in one respect, for they contain a larger proportion of ultra-violet rays. Sunlight contains rays of a wave-length of from three hundred and fifty to three hundred micromillimetres, while in the electric light are rays with a much shorter wave-length. To obtain the strongest possible effect, the electric light is concentrated by the aid of lenses of rock crystal. This is penetrable by rays having a wave-length of two hundred micromillimetres, while glass only transmits rays of from three hundred and fifty to three hundred micromillimetres wave-length. While the rays from a thirty-five-ampère arc-light, when concentrated through a Finsen apparatus of older construction, with glass lenses, kill *Bacillus prodigiosus* in about half an hour, this micro-organism is killed by a few seconds' illumination with light concentrated through rock-crystal lenses under the same conditions. For the concentration of solar light, however, glass lenses can be used, as these are permeable to all the ultra-violet rays which exist in sun-

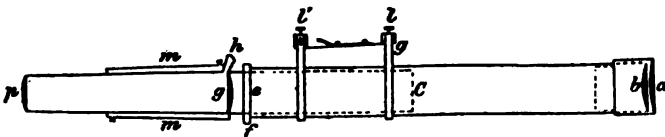


FIG. 1.—Apparatus for concentrating sunlight. Size 1:10.

light. All the solar rays with shorter wave-lengths are absorbed by the atmosphere, which has exactly the same absorption coefficient as glass.

Sunlight is concentrated by the aid of the apparatus shown in Fig. 1. This consists of a lens which is composed of a flat and a convex glass inclosed in a brass ring, between which there is an ammoniacal solution of copper sulphate. Since one surface of the fluid is arched and the other flat, it acts as a plano-convex lens; it is preferable to a solid glass lens because it not only concentrates but also cools the light. This result may also be obtained by passing the light through a blue liquid. Water absorbs the strongest ultra-red rays (the dark heat rays). By the addition of a blue coloring matter a part of the red, yellow, and green rays are also intercepted; these likewise possess considerable heat, but are useless as therapeutic agents, because their bactericidal and expulsive action is extremely small. The light is made just blue enough so that it cannot burn the patient.

FIG. 2.



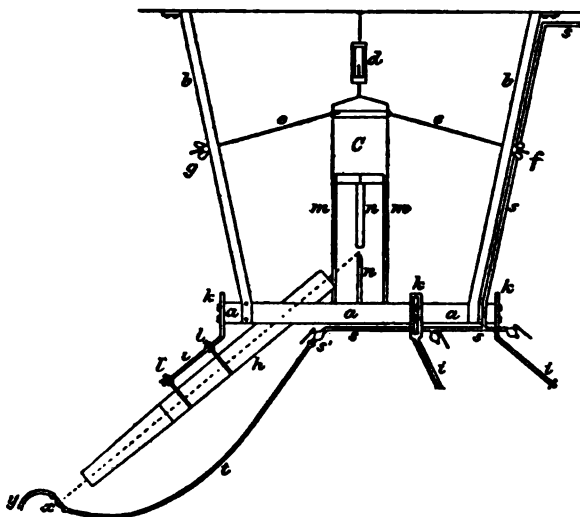
Apparatus for concentrating electric light. Size 1:11.

The lens is fastened to a support in such a manner that it can be moved in any direction, so that it may easily be fixed at a right angle to the sun's rays, and in such a position that the light shall strike the part of the patient's skin which is to be treated. The apparatus stands on a little table; the patient sits by its side or lies on a bed.

In the *treatment by electric light* the rays emitted by an arc-light of from sixty to eighty ampères pass through an apparatus which, like that just described, simultaneously concentrates and cools them. They are concentrated by rock-crystal lenses inclosed in two brass tubes arranged like those of a telescope. Nearest the light are two lenses (Fig. 2, *a*, *b*), which together have a focus of twelve centimetres. When this apparatus is extended to the proper length and so placed that the carbon points of the arc-light are twelve centimetres from the nearest lens, the divergent rays from

the light become parallel within the brass tube, at whose lower end they encounter two lenses (*g, p*), which bring the parallel rays to a focus about ten centimetres beyond the lens *p*. In the part of the apparatus between the lenses *g* and *p* there is distilled water, which cools the light by intercepting the ultra-red rays, without absorbing any of the blue, violet, or ultra-violet. To avoid too much heating of the distilled water, common cold water may be made to flow through the cap *m m*, which encircles the lowest part of the apparatus. Here one cannot, as in the solar apparatus, color the distilled water blue to obtain the greatest absorption of the heat rays, for the

FIG. 8.



Electric-arc light with four concentrating apparatuses. Size 1:22.

blue coloring matter would intercept a part of the ultra-violet rays and the advantage gained by the use of rock crystal would be lost.

Around each electric light are hung four concentrating apparatuses on an iron ring (Fig. 3, *a a*), which is held by iron supports (*b b*) made fast to the ceiling. The light is raised and lowered by a screw (*d*), and may be exactly centred by the aid of four sail-thread cords fastened to screws (*f, g*). The concentrating apparatuses are held by iron arms (*k, i*) at an angle of one hundred and thirty degrees, in which direction they receive the strongest light from the lamp. The concentrating apparatuses are fastened to the arms by screws (*l*, Figs. 2 and 3). At *l'* are three small screws

which serve to turn the apparatus around l as a fixed point and so adjust it to the carbon points. By this arrangement one is able to bring the lights and apparatuses in such a position with reference to one another that the carbon points in all four of the apparatuses may stand before the burning point, and that the axes of the apparatuses may be parallel with the axis of the ball of light, and that the light may not strike against the sides of the apparatus.

By sliding the one brass cylinder within the other, the converging rays may be brought together at the height which is most suitable for the patient, who lies or sits in such a position that the spot of the skin being treated is situated at or slightly beyond the focus.

Although the light is cooled in its passage through the concentrating apparatus, it is yet too hot to be directed upon the skin without detriment. Hence the skin itself must be so protected that

FIG. 4.



Compressor for the skin. Size 2:3.

it shall not become injuriously heated. This is brought about, both for sunlight and for the electric light, by a small apparatus (Fig. 4, and see Fig. 3, x), which consists of a conical brass ring closed on both sides with rock-crystal plates; the largest of these is plane, the smallest plano-convex. The brass ring has an influx-tube and an efflux-tube filled with running cold water. It has also four small metal arms; to these are attached rubber bands, by which it can be pressed against the portion of the skin that is to be treated. The cold water cools the skin so much that even very hot light does not injure it.

Besides cooling the surface, this apparatus has another important function,—that is, to expel the blood from the skin. As I have said before, Professor Finsen showed experimentally that the actinic rays can penetrate only bloodless tissue. When by the help of the rubber bands the plano-convex plate of rock crystal is pressed

against the skin, this becomes bloodless, and the light can then reach and kill the bacteria.

Immediately after the treatment the skin is slightly red and swollen. The inflammation increases gradually and attains its maximum the next day. However, this photochemical inflammation is clearly distinguishable from that produced by heat, which, as is well known, quickly follows burns and soon reaches its highest point. The inflammation is often so severe that a vesicle is formed, but we have never known necrosis to result. What significance in furthering the healing process this inflammation has in reference to the bactericidal action of light cannot be definitely decided; it probably has no small influence in every case of lupus.

As this treatment is based upon the bactericidal properties of concentrated light, Professor Finsen limits its application to diseases which are superficial, local, and of bacterial origin. It was not previously certain that other pathogenic fungi are killed by light, but I have shown that this is the case with *Achorion Schönleinii*, *Trichophyton tonsurans*, and various other mould and fermentation fungi.

Professor Finsen decided to test this method first on lupus vulgaris, which is a local bacterial and usually quite superficial disorder, and thus possesses exactly the properties that render it suitable for the employment of this treatment. On account of its obstinacy the disease is, besides, an especially good test for a new therapeutic agent. Researches have since been undertaken at the clinic of "Finsen's Medical Light Institute" in the treatment of a number of skin diseases whose bacterial origin is certain or probable, but only in the following diseases have a sufficient number of cases been treated to speak with certainty of the effects.

In all, six hundred cases of *lupus vulgaris* have been treated. There have thus been obtained sufficient observations on which to base a reliable estimate as to the value of the method.

Each day about five square centimetres of the skin were treated for one hour. From the spot first treated one goes systematically forward over all the diseased region. After the inflammation caused by the light has subsided and the scurfs, which have been derived from the vesicles, have fallen off, the circumference of the lupus patch is seen to be in the course of forming scar tissue, the



FIG. 6.—Treatment with concentrated sunlight.



FIG. 6.—Treatment with electric-arc light.

skin is smoother, more even, and clearer, and where ulcerations have existed they are beginning to heal. Finally, all is transformed into even, smooth, white scar tissue, scarcely perceptible.

This process occurred very regularly in all the six hundred patients except about five, in whom either the disease spread so rapidly that amelioration could not keep pace with it or the pathological change lay so deep that the light could not fully reach it. This result is the more striking because among the patients treated were a disproportionate number of severe cases. Both physicians and people soon had such confidence in the method that a multitude of patients whose cases had long been given up as hopeless came forward for treatment. The clinic has taken all who came, refusing none, even to two very severe cases, one of which was almost in its last stages.

For the first two and one-half years the patients (in all one hundred and thirty) were treated by light exclusively, as is still done in all cases which are not very severe. After Professor Finsen became persuaded by experience that even very severe cases could be cured by light alone, he began, in the worst cases, to combine with this treatment the use of pyrogallol, to save the time of the patients and to make the skin smooth and as easily penetrable to light as possible. While one part is treated by light another is covered with pyrogallol salve. When the corrosions are healed by zinc salve, these portions of the skin are also treated with light. All ulcerations are kept free of scurfs by the use of sterile water.

In the least advanced cases only the outermost part of the septum narium, together with the outermost parts of the mucous membrane of the gums, tongue, and cheek, are treated. The rest of the mucous membrane is pencilled with Lugol's solution or cauterized with the galvano-cautery.

The chief advantages of the method—aside from its trustworthiness—are its painlessness, its striking cosmetic results, the rareness of relapses, and their slight extension.

The good cosmetic result is the consequence of no tissue, either healthy or diseased, being destroyed. In sound skin treated by this method no trace remains except pigmentation, and all that occurs in the diseased parts is infiltration and transformation into scar tissue. Above all, no piling up of tissues takes place. The treat-

ment is, therefore, as mild as possible,—a great advantage, in view of the tendency of the disease to return, for, as nothing is destroyed, both the diseased area and the apparently healthy skin around it may be treated until all disease germs have been killed. From the cases at the end of the article and the pictures a fair estimate may be formed of what may be done by this method. The principal treatment is continued until no lupus nodes can be detected; it is then suspended till the swelling and redness of the skin have disappeared, so that the practitioner may better observe whether there is yet anything diseased. When nothing is found, the patient is henceforth kept under observation.

As might be expected, from the well-known obstinacy of the disease, owing to the scaling of deep-seated pigmented lupus nodes from small scars left by the nodes, many of the patients are subjected to an after-treatment of longer or shorter duration. When the red and swollen lupous tissue has been transformed into a white and smooth scar lupus nodes may often be seen in it. No matter whether these are indications of a relapse or are lumps which could not be seen before on account of the red and swollen background, but which now are made manifest by contrast with the scar tissue, there almost always remain a few scattered nodes, which, however, disappear under a short after-treatment. As the actinic therapy is painless,—it causes no other suffering than that produced by the pressure of the cooling instrument (Fig. 4) against the lupous tissue, which is only slightly sensitive,—the patients willingly come for after-treatment and inspection, so that any relapse that may occur can be treated at its very beginning. On the contrary, one of the chief difficulties with the operative methods is that, as they are all painful, the patients are unwilling to submit to a second operation. Since the danger from relapses—that reef on which most of the methods of treating lupus vulgaris have stranded—is practically eliminated, it may be regarded as settled that lupus vulgaris can be cured with certainty by Finsen's method.

The treatment of *lupus erythematosus* gives by no means such favorable results. In a large proportion of the cases treated a permanent cure, with good scars, was obtained, but single cases have been very obstinate and inclined to recur. Considering how little has been accomplished by other methods of treating this dis-

ease, however, it may be said that the results of Finsen's method have been very satisfactory.

So many cases of *alopecia areata* have been treated that a definite decision may now be rendered as to the effects of the treatment. Its employment in cases of this disease is rational, partly because the lesion doubtless is, sometimes, at least, of microbic origin, and partly because the best methods of treatment (Vidal's, Besnier's, etc.) employ local irritants, and light is an excellent irritant, which has the advantage, besides, that it penetrates into the depths and promptly kills the bacteria.

We must, of course, be careful in judging how any therapeutic agent acts upon this disease, since it has a tendency to spontaneous healing. Control experiments have been made by treating one half of a bald spot and not the other. Regularly, a month or two after the close of the treatment, fine lanugo hairs begin to appear on the bald spot, and in the course of two months it is covered with a normal growth of hair. Even diffused cases have been cured by this method, which is also trustworthy as to relapses.

Eighteen patients with *epithelioma of the skin*¹ had been treated when Professor Finsen published the first series in the Dermatological Society of Copenhagen. Of these two gave up the treatment in so short a time that they cannot be taken into consideration. The results in the remaining sixteen cases were as follows: in three the treatment was ineffectual, five patients were benefited but not cured, and eight were cured. Of the latter one was without relapse for two and one-half years, two for eleven months, one for nine and one-half months, and four for about half a year.

Our researches have shown that the power of light may be used with favorable results in cases of epithelioma which are superficial, well defined, and seated in places easily accessible to the treatment.

A non-bacterial disease may also be successfully combated with concentrated light,—e.g., *telangiectasia (nævus vasculosus)*. As

¹ A more detailed account is found in V. Bie, *Behandlung von Hautepthe liomen mit concentrirtem Licht*, Dermatologische Zeitschrift, Band vii, Heft 4.

is well known, all the methods of treatment hitherto employed for this condition aim to bring about the contraction of the dilated vessels. Professor Finsen deemed it possible that such shrinkage might follow the considerable infiltration of the skin which takes place as a consequence of illumination with concentrated light. Several patients have now been treated, and the results have been especially encouraging. When the inflammation caused by the light has abated, the bright red spot is bleached out and under this treatment may entirely disappear, leaving the skin almost normal, only slightly pale, atrophic, and depressed a little below the level of the surrounding surface. Some of the patients have been cured; the others are improved. I cannot give detailed illustrations, as the material at hand has not yet been prepared.

“Finsen’s Medical Light Institute,” which I have mentioned several times in the foregoing, is a free public institution, established for scientific research, whose object, according to its statutes, is, “to institute and forward researches on the effects of light on the living organism, chiefly having in view the use of light in practical medicine.”

The institute was erected in 1896, after Professor Finsen had awakened interest in the physiological effects of light by various experimental labors, especially by his treatment of smallpox in red light and by having cured a case of lupus vulgaris with concentrated actinic rays. To furnish good conditions for the continuance of Finsen’s work, the institute was founded by a number of university professors and distinguished men, who, moreover, were to have charge of its management. By a considerable contribution from the Danish Government and the Commune of Copenhagen, the institution was placed in a position for steady expansion, so that now, besides its superior members, Professor Finsen employs seven physicians, a chemist, a physicist, and thirty-five nurses, together with five skilled assistants (an electrician, a photographer, and three clerks).

To enhance its activity by the specialization of labor, the institute is separated into two departments,—a laboratory and a clinic, each with its special members. Professor Finsen is the chief of the entire establishment.

The work of the clinical department—besides the treatment of



FIG. 7.—Case I. before treatment (photographed May 6, 1900).



FIG. 8.—Case I. after treatment (photographed March 7, 1901).

patients having the skin diseases herein described—consists in researches for the further development of the therapeutics of concentrated light, together with investigations regarding photochemical baths,—that is, baths in which the chemical rays proceeding from arc-lights of one hundred ampères are the active agent. As these light-baths are only in the experimental stage, I will not describe them further.

The aim of the chemical, physical, bacteriological, and physiological researches carried on in the laboratory is, through a better knowledge of the effects of light on living organisms, to furnish a trustworthy foundation for the future development of light therapy.

CASE I.—Female, aged thirty-one years.

Clinical Diagnosis.—Hypertrophic ulcerative lupus vulgaris of the nose, of the nasal cavities, extending to the larynx, of both cheeks, and of the chin.

Previous History.—The disease is of six years' duration, the chief treatment employed being that of scraping the ulcers, and the application to the nasal cavities of tampons moistened with a solution of bichloride of mercury or of Lugol's solution, and of the galvano-cautery.

Treatment.—On May 5, 1900, just before the commencement of treatment here (Fig. 7), small, partly confluent ulcers were found on the nose with considerable destruction of both alæ and ulceration of the nasal cavities. The larger portion of the upper lip was attacked, and on the left cheek there was a patch of lupus, measuring five centimetres in diameter, with quite large, partly confluent nodes. The right cheek is also affected, and on the chin there was a diseased area some two centimetres across. In ten months, with three interruptions of treatment, one hundred and ninety-two applications were given. After three months the number of nodes were fewer and the ulcers less deep. On November 5, 1900, there was good healthy scar tissue, but with single typical deep lying lupus spots. When seen January 8, 1901, there were but four small nodes to be found, one each on the right ala nasi, on the right cheek, on the left cheek, and on the furrow of the chin. On March 7, 1901, when the photograph was taken (Fig. 8), there were only to be seen two slightly scaling patches. The skin

everywhere smooth, and there were no nodes visible. In the nasal cavities a few non-confluent ulcerations still remained.

CASE II.—Female, aged thirty years.

Clinical Diagnosis.—Lupus vulgaris of the face, of the nasal cavity, of the gums, of the uvula, and of the hard palate.

Previous History.—The duration of the disease is about five years, during which time treatment consisted of the use of the curette, of sublimated tampons, of the galvano-cautery, and the application of a salve of potassium iodide.

Treatment.—On June 21, 1898, when treatment was first commenced, the disease was partly nodose, of an ulcerative character, the edges of the alæ nasi, especially of the right, having disappeared. The skin was considerably infiltrated and reddened, and covered with scales. The extent of skin involvement is readily seen from the picture (Fig. 9). Besides this, lupus was found in the nasal cavity, on the gums, on the uvula, and on the hard palate. On September 8, 1898, the injured surface was almost healed, only small ulcers at the nostrils being present. As the healing progresses deep lupus nodes can be seen. On October 13, 1898, the healing having progressed continually, the parts presented a smooth appearance, no sores and a very few nodes being seen. On November 28, 1898, treatment was discontinued, the patient having received one hundred and thirty-nine sittings. On May 3, 1899, the treatment was resumed, as the disease during the last few months had again progressed and extended from the corners of the nostrils up to the apex of the nose. On the cheek and ridge of the nose is found smooth scar tissue, while on the septum are found small scruffing sores. Treatment was again discontinued on June 24, 1899, as there were no signs of lupus, and was not resumed until June 30, 1900, for one week, because of a very small ulceration on the apex nasi, which developed lupus. During the year 1900 the patient received at intervals twenty sittings, and up to March 26, only six sittings for 1901; her condition at this time is good; the mucous membranes are healed, except an ulceration from deficiency of the septum nasi; there is white scar tissue without nodes or pigmentation (Fig. 10).

CASE III.—Male, aged twenty-seven years.

Clinical Diagnosis.—Lupus vulgaris faceri, colli, cavitatis nasi.

Previous History.—The disease has lasted thirteen years, dur-



FIG. 9.—Case II, before treatment (photographed June 21, 1899).



FIG. 10.—Case II, after treatment (photographed September 2, 1899).



FIG. 11.—Case III. before treatment (photographed December 10, 1908).



FIG. 12.—Case III. after treatment (photographed December 11, 1909).

ing which time treatment has consisted of the curette, the cautery, and the application of an ointment.

Treatment.—When first seen (Fig. 11), on December 10, 1898, the whole of the nose and upper lip, besides the greater part of both cheeks, half of the right eyebrow, and a spot on the neck were involved. There were found numerous nodes, small confluent ulcers in the nostrils and on the neck, while on the cheeks and neck are separate spots of uncertain scar tissue. The mucous membrane, the alæ, and the septum of the nose were attacked, causing much depression of the apex, and had been treated by a sublimate solution.

From January 1, 1899, to December of the same year treatment was given with slight interruptions, with marked improvement in the disease, there being almost no infiltrations, but good scar tissue over all. The patient was photographed on December 11, 1899 (Fig. 12).

On May 1, 1900, treatment was discontinued, the condition remaining good up to November 17, 1900, when two small, deep spots on the right cheek were treated by the galvano-cautery, and two pigment spots on the same cheek received two treatments by light.

Up to March 2, 1901, the patient presented on the right cheek a node the size of a pin's head, on the upper lip two suspicious spots and some scaling; otherwise smooth scar tissue is present. The mucous membrane of the nose is smooth.

The number of sittings the case received were two hundred and forty-six, extending over two years of treatment, having been given, in 1898 eighteen sittings, in 1899 one hundred and twenty-two, and in 1900 one hundred and six sittings.

CASE IV.—Male, aged sixteen years.

Clinical Diagnosis.—Lupus vulgaris of the face, cavity of the nose, gums, palate, and lips.

Previous History.—The disease is of seven years' duration, in which time treatment has been applied with varying results, having at one time been pronounced cured, only to have a recurrence at the end of six months. Cod-liver oil, residence of eleven months in a coast hospital, creosote, and baths formed the chief applications.

Treatment.—At the beginning of treatment, January 3, 1899,

there is found deep, infiltrated, really nodose lupus, which embraced the nose, both cheeks, upper lip, and a little of the under lip; there are numerous diffused nodes on the cheeks. There are ulcers on the edge of the nostrils, with destruction of the alæ nasi. The mucous membrane was treated with potassium iodide and the galvano-cautery. Treatment was continued until September 1, 1899, at which time smooth scar tissue covered everything, much pigmented spots, no considerable node, and some firm, scar-like infiltration around the right turn of the mouth were present. The under lip was treated in three sittings, but not without difficulty, as the infiltration and ulceration, which often happens in such cases, is obstinate. In July, 1900, the disease was healed. When the case was last seen, February, 1901, there was nothing pathological on the lips except a small ulcer on the mouth (Figs. 13 and 14).

CASE V.—Male, aged fifty-seven years.

Clinical Diagnosis.—Lupus vulgaris of the face, cavity of the nose, and of the palate.

Previous History.—The disease began fifteen years ago, during which time the treatment has consisted in curettement, pencilling with turpentine and the application of zinc chloride and the galvano-cautery.

Treatment.—The case at the beginning of treatment, February 1, 1899, presented the nose deformed by destruction of apex and part of septum, with entire infiltration of the skin of the organ, which is red and smooth. The septum was deviated to the left and thickened, there was ulceration of the left ala nasi, of which one-half had disappeared. The right ala was thickened. As a whole, node formation was slight. There were on the right cheek four ulcers, and on the left cheek one. On the right of the upper lip single small nodes were present. The cavity of the nose and the soft palate were also involved. During treatment, in which the patient received seventy-three sittings at varying intervals and more or less interruptions, the disease has steadily improved, and on February 13, 1901, when he was photographed, his condition presented smooth scar tissue over all, with at the root of the right ala nasi a crusted node the size of a hemp seed. The mucous membrane of the nose is normal (Figs. 15 and 16).

CASE VI.—Female, aged thirty-eight years.



FIG. 13.—Case IV. before treatment (photographed January 1, 1899).



FIG. 14.—Case IV. after treatment (photographed February 26, 1901).



FIG. 15.—Case V. before treatment (photographed February 1, 1899).



FIG. 16.—Case V. after treatment (photographed February 13, 1901).



FIG. 17.—Case VI, before treatment (photographed April 6, 1899).



FIG. 18.—Case VI, after treatment (photographed January 21, 1900).



FIG. 19.—Case VII, before treatment (photographed May 20, 1899).



FIG. 20.—Case VII, after treatment (photographed February 7, 1900).

Clinical Diagnosis.—Lupus vulgaris of the face, of the cavity of the nose, of the upper lip, and of the palate.

Previous History.—The duration of the disease is four years, the treatment having consisted mainly of ointments and cauterization.

Treatment.—Just before the beginning of treatment, April 6, 1899, the condition present was one of hypertrophic lupus of an ulcerative character, the soft parts of the nose were much swollen and ulcerated with loss of part of the alæ and septum, the skin of the lower part of the nose was brownish-red and contained some diffused nodes. The cheeks were also involved, which were red, much infiltrated, numerous small ulcers with occasional scars. The upper lip was very much thickened, prominent, with diffused nodes and ulcers on the front. The left eyelid, eyebrow, and gabella presented lupus spots one to two and one-half centimetres in diameter. The mucous membrane of the nasal cavities, of the upper lip, the gums, and the palate were also involved. The right cheek was treated by pyrogallol salve (Besnier) for four days. Treatment has extended over a period of two years with several interruptions, and in which time she received two hundred and thirty sittings. The disease has been steadily improving; there is good scar tissue, which is smooth and pale, the left cheek and lips are entirely free, on the right cheek is a single small node, while on the nose are four small pigmented spots. The mucous membrane of the nose is healed. The patient is still free from the disease (Figs. 17 and 18).

CASE VII.—Female, aged eighteen years.

Clinical Diagnosis.—Lupus vulgaris of the face, of the cavity of the nose, and of the gums.

Previous History.—Duration of the disease is four years, the chief treatment having been ointments, cod-liver oil, iron, curette, cautery, and corrosion with silver nitrate.

Treatment.—At the beginning of treatment, May 5, 1899, the disease had attacked the nose and the greater part of the left cheek. Two nodes are found on the right cheek while the upper lip was infiltrated, scaly, and contained suspicious, deeply pigmented spots. On the nose the condition was of an hypertrophic character.

Steady improvement occurred from the beginning to the end of treatment, December 14, 1900; the nose is natural in shape and quite firm; there are some deep pigmentations, and good scar for-

mation on the left cheek. No nodes are found in the nasal cavities, although there is some inclination to scaling. The patient received one hundred and twenty-five sittings, and reports herself as being now perfectly well.

CASE VIII.—Female, aged sixteen years (Figs. 19 and 20).

Clinical Diagnosis.—Lupus vulgaris of the right cheek.

Previous History.—No treatment has been tried since the disease began four years ago.

Treatment.—When she appeared here for treatment on July 11, 1899, there was found on the right cheek an oblong lupus spot, slightly prominent, brownish-red color, slightly scaly, with much pigmentation of the deep parts. By the diaphanoscope two or three typical lupus nodes were seen. From July to September the patient was treated by sunlight, receiving twenty-three sittings. The scar is faintly visible, and no nodes, scales, or pigmented spots are manifest. She was photographed on January 20, 1900, her condition being still unchanged (Figs. 21 and 22).



FIG. 21.—Case VIII. after treatment in one sitting (photographed July 11, 1889).



FIG. 22.—Case VIII. after treatment (photographed January 20, 1900).

ANTITOXIC SERA: THEIR PREPARATION AND STANDARDISATION.

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IN describing the preparation of antitoxic bodies it is impossible to avoid touching upon the subject of immunity, so that I must briefly indicate the current views on this subject before detailing the methods of preparation and standardisation of antitoxic sera.

When we say that an individual is "immune" to a disease, we mean that he or she is not susceptible to that disease or its specific organism, or to the toxins evolved during the growth of that germ, whether exposed to the possibility of infection under natural conditions or under those artificially produced in the laboratory or elsewhere. For example, man is immune to certain diseases affecting the lower animals, such as swine-fever, and, conversely, it seems impossible to infect birds with the pneumococcus.

Immunity to any given disease may be natural or acquired.

Natural Immunity.—Natural immunity, for greater convenience, is usually considered from two points of view,—viz., (1) *Racial immunity*, obviously the result of the long-continued operation of two factors,—natural selection and heredity; such immunity remains constant and unvarying at all ages. (2) *Individual immunity*, which is relatively greater at some particular period or periods than during the remainder of life.

Natural immunity depends upon the presence of certain naturally formed substances, termed "alexines," in the blood-serum of the individual, which enables him to resist infection. Such immunity, however, is never absolute. By this I mean that the subject may be immune so long as natural conditions obtain, but is still liable to infection when artificial conditions are experimentally produced. As an instance, one may suggest the natural immunity exhibited towards the anthrax bacillus by the fowl and

the frog; the former hot-blooded, with an average temperature of 41° C. (105.8° F.), the latter cold-blooded, with an average temperature of 10° C. (50° F.). If, now, the heat production of these two animals be so influenced that the body temperature of the fowl be reduced, say to 35° C. (95° F.), whilst that of the frog is raised to 35° C., neither animal can successfully resist anthrax infection.

Acquired Immunity.—Acquired immunity may likewise be divided into two groups,—active and passive.

(1) *Active immunity* towards a disease results from a previous attack or vaccination with a modified form of the disease. Such immunity sometimes persists for long periods, perhaps for life, as in the case of smallpox; occasionally, however, the immunity conferred by one attack of a disease may be of so short a duration as to be measured only by days or weeks, as, for example, in pneumonia or diphtheria.

The exact *rationale* of the production of this active immunity is at the present moment a matter of keen controversy, and many and ingenious are the theories put forward to explain the process. Here I need only say that during recovery from some diseases—*e.g.*, typhoid, diphtheria, etc.—the presence of complex substances, designated by German workers “Antikörper,” has been demonstrated in the blood, and these substances are highly antagonistic either to the vital activity of the organisms provoking the disease, to the resulting toxin, or to both. Thus it would appear that infection by the organism not only results in an attack of the disease, but also initiates an immunizing process, which under favorable conditions becomes in course of time so complete as to bring the disease to a natural termination, and convalescence follows.

(2) *Passive acquired immunity* is a phenomenon of laboratory production, and is of comparatively short duration. It is produced by the injection either of sterilized cultivations of an organism (or the soluble toxins produced during its life and growth) or of serum obtained from animals which have already had immunity to the organism conferred upon them by one or the other of these methods.

Toxins.—The word “toxin,” strictly speaking, denotes any noxious or poisonous substance, but modern medicine has practically restricted its meaning to such poisons as are elaborated by the low-

est forms of life, bacteria, during the course of their growth. These toxins may be intracellular or extracellular,—in the one case bound up in the bodies of the bacteria producing them, in the other held in solution by the medium in which the bacteria are living. In the laboratory toxins out of this latter class are usually prepared from organisms by cultivating them in a fluid medium for a period varying with each species of bacteria, and then filtering the culture through a Pasteur-Chamberland or Berkefeld filter and so separating the soluble toxin from the bodies of the bacteria.

If the filtrate or toxin is kept for any length of time, it undergoes certain alterations in composition, resulting in a diminution of toxicity, due to the formation of "toxoids," a term also applied to toxins which have been artificially attenuated by means of heat or chemical reagents.

The Formation of Antitoxins.—Antitoxins are substances which under certain conditions are formed within the bodies of living animals, and which are able to neutralize or render inert corresponding toxins. In other words, if under favorable conditions we administer suitable doses of a toxin to an animal, that animal will elaborate within its body substances which are antagonistic to the particular toxin used. These antitoxins are found to be most abundant and most potent in the blood-serum of the animal,—a most fortunate circumstance, as in this situation they are readily accessible and may be obtained in quantities available for administration to other animals.

It must be remembered, however, that antitoxic serum—that is, blood-serum containing antitoxin—is essentially specific, and therefore somewhat limited in action. That is, given a certain kind of antitoxin, it will only neutralize or render inert the particular toxin which was employed to provoke its production. For example, if one unit of toxin *A* yields one unit of antitoxin *a*, one unit of toxin *B* yields one unit of antitoxin *b*, and one unit of toxin *C* yields one unit of antitoxin *c*, then unit *a* will neutralize unit *A*, unit *b* will neutralize unit *B*, and unit *c* will neutralize unit *C*; but unit *a* will not neutralize unit *B* or unit *C*, unit *b* will not neutralize unit *A* or unit *C*, and unit *c* will not neutralize unit *A* or unit *B*.

The preparation of antitoxins must not be regarded as a simple matter or one involving only the careful carrying out of some rule

of thumb, for in some cases we are unable to produce a toxin experimentally from the pathogenic organism; we are, therefore, unable to determine whether its composition is such as will render the production of an antitoxin possible. In other instances, though we can produce the toxin, we are totally unable to obtain an antitoxin. The toxins for which antitoxins can be prepared are always in close association with proteid molecules; indeed, it is a moot point whether they are not themselves essentially proteid in character; and the point remains unsettled, as, up to the present time, no one has been able to separate toxins from their associated proteids.

Toxins to which antitoxins can be prepared may be classified as follows: (1) Bacterial toxins. (These—*e.g.*, diphtheria, tetanus—are apparently proteid in character, and have not yet been isolated in a state of chemical purity.) (2) Snake venom. (This is not yet separable from proteid by chemical means.) (3) Poisonous blood-serum. (One of the most highly toxic is that of the eel, and here again the toxins appear to be inseparable from the proteids of the serum.) (4) Vegetable poisons. (Such as abrin,—from jequerity seeds,—ricin, and crotin; these are also apparently proteid in character.)

On the other hand, all attempts to produce antitoxins to the alkaloids, such as morphine and strychnine, have completely failed, although individual tolerance to them can usually be established.

Antimicrobial Serum.—Non-fatal doses of bacteria which may or may not produce powerful toxins, or dead cultivations of bacteria killed by exposure to a temperature of 60° C. (140° F.) or by the application of antiseptics, along with the products of their metabolism, are in like manner utilized in the immunization of animals, and during the process antibodies are formed and can be demonstrated in the serum. These exert upon the bacteria themselves a direct influence of a destructive, inhibitory, or bacteriolytic character. Such sera are termed antibacterial or antimicrobial. As examples may be mentioned those formed as the result of the injection of cholera or typhoid germs into animals. (Antibacterial sera must not be confounded with vaccines, which are simply dead cultures used in provoking the elaboration of the antibodies.)

The Preparation of Antibodies for Therapeutic Purposes.—The animal usually chosen for the purpose of manufacturing anti-

toxins, etc., is the horse, and the reason is twofold. In the first place, the horse is a large animal, and large quantities of blood can be removed from its body without ill effect. Secondly, in a general way it may be stated that the blood-serum of any animal is toxic in a greater or less degree when introduced into the body of an individual belonging to another species, but so far as the human subject is concerned the serum of the horse is less toxic than that of any other large animal, although even its slight toxicity is sufficiently evidenced by the occasional appearance of cutaneous rashes upon patients who have been treated by the injection of antitoxic sera derived from this animal.

A fairly sound horse having been selected, it is placed in quarantine for a certain period, and carefully observed in order to detect any obvious organic disease which might render its use inexpedient. It is next tested by injecting suitable doses of tuberculin and mallein (*i.e.*, fairly powerful toxins prepared from the tubercle bacillus and the glanders bacillus respectively), in order to render manifest any latent tuberculosis or glanders, diseases which would soon render the animal totally unfit for the preparation of therapeutical serum. Having successfully passed through these various tests, the animal is now ready for active treatment.

The general principle of the preparation of antitoxic serum is to administer gradually increasing quantities of the selected toxin at suitable intervals, using doses sufficiently large to provoke a febrile reaction, until the animal can resist a considerable multiple of the initial dose. As a concrete example let us take the preparation of diphtheria antitoxin. The selected animal first receives a dose of diphtheria toxin varying in quantity from one to ten cubic centimetres, according to toxicity on the one hand and to the susceptibility of the horse on the other, for individual horses vary greatly in this respect, and extreme care must be exercised in the early injections. The toxin is injected under the skin of the shoulder (strict aseptic precautions being observed throughout), and produces within a few hours a marked reaction, consisting of a rise of body temperature and a swelling, often of considerable size, localized to the seat of injection. These effects soon pass off, and in the course of a few days the dose may be repeated, or increased if the reaction after the previous injection was not too

severe. The treatment is continued, gradually increasing the dose of toxin, until after the lapse of two or three months the animal will no longer react even to such huge doses as one hundred or two hundred cubic centimetres of the toxin; and in the later stages the treatment may be modified by injecting the toxin into the jugular vein instead of subcutaneously. Care must be taken that the immunization is not pushed on too rapidly, or the general health of the animal will suffer and the antitoxic properties of its blood be rapidly lost.

Sometimes the treatment is commenced by conferring upon the animal what is termed a "foundation immunity." This may be effected in various ways. For instance, one may inject as a preliminary step "toxoids,"—that is, toxins which have been modified or attenuated by exposure to a temperature of 60° C. (140° F.) for a considerable period (as is done in the case of diphtheria toxin), or to which some chemical reagent, such as carbon bisulphide, has been added (as is done with tetanus toxin), or, on the other hand, a quantity of suitable antitoxin, at least sufficient to neutralize the initial dose of toxin, may be simultaneously injected, or doses administered during the early stages of the treatment.

Small quantities of blood are drawn off from time to time and the antitoxic properties estimated. As soon as the antitoxin is found to be present in the serum in sufficient quantity, the external jugular vein on one side is opened and blood to the extent of several litres is received therefrom in suitable sterile flasks, every precaution, of course, being taken to prevent either the wound or the blood from being accidentally contaminated by adventitious organisms. The blood is then allowed to clot, and the serum which exudes is collected and standardised. Some preservative, such as phenol (0.5 per cent.) or trikresol (0.25 per cent.), is added, the serum is filtered through a porcelain filter-candle, and finally measured doses are placed in small vials or tubes and carefully sealed. Occasionally, instead of preserving the serum as a fluid, it is spread out on flat plates and evaporated to dryness at a low temperature *in vacuo*, and the resulting scales of proteid material plus all the antibodies are stored in the dry condition.

Preparation of Antiabrin, etc.—In contradistinction to the tedious method just detailed, it may be mentioned that in order to produce antibodies to such toxins as abrin, ricin, etc., it is suffi-

cient to feed the animals upon these poisons, and after periods varying from six weeks to two months the presence of corresponding antibodies may be demonstrated in the serum.

Standardisation of Antitoxic Serum.—In working with toxins and antitoxins, varying as they do in toxicity and antitoxicity, the necessity for some unit to which they may be referred and with which they may be compared is at once obvious; and in arriving at a just estimate of the relative potency of toxin and antitoxin, the only criterion which has proved sufficiently accurate depends upon their interaction within the bodies of living animals.

In the first place, the strength of toxin employed must be accurately ascertained. Take, for example, the toxin produced by the diphtheria bacillus: varying quantities of this toxin are injected subcutaneously into young guinea-pigs of about two hundred and fifty grammes weight (young animals being chosen in order to avoid fallacies due to individual immunity and resistance), and the smallest dose that will invariably cause death within four days is termed "the minimal fatal dose." The selected "standard" with which others are compared is a toxin of such strength that one-hundredth of a cubic centimetre will invariably cause death in a guinea-pig of two hundred and fifty grammes weight within four days, and may be expressed as " (DTN^1) ,"—i.e., diphtheria toxin normal. If the minimal fatal dose of a sample of toxin should be only five-hundredths of a cubic centimetre, we express its strength as (DTN^2) .

Having obtained a standard unit for the toxin, we are in a position to standardise our antitoxin, and here again the living animal body must of necessity take the place of the test-tube.

Antitoxin Unit.—The first antitoxin unit suggested was "ten times that quantity of antitoxic serum necessary to neutralize ten minimal fatal doses of toxin." This unit, however, is unsatisfactory, because we have no means of ascertaining the number of toxic units present in ten minimal fatal doses. It is obvious that an animal will resist the action of any toxin up to the maximum non-fatal dose; therefore, the minimal fatal dose simply consists of one maximal non-fatal dose plus just so much or so little toxin as is necessary to convert it into a minimal fatal dose. This factor we will represent by the letter x , and form an equation thus: 1 min. fatal dose = 1 max. non-fatal dose + x . That being so,

ten minimal fatal doses consist of ten maximal non-fatal doses plus ten times x , and, therefore, if you only use enough antitoxic serum to neutralize nine minimal fatal doses and the ten x , the animal lives, being itself able to withstand the one maximal non-fatal dose.

Ehrlich, however, by a complicated series of experiments was able to produce a standard antitoxin of such strength that one unit neutralizes one hundred fatal doses. This standard antitoxin is preserved *in vacuo*, in a glass bulb connected up with a second glass bulb containing anhydrous phosphoric acid, to ensure a perfectly anhydrous state. The method of standardisation now adopted consists of two distinct stages.

In the first place, a stable toxin is prepared by keeping the toxin filtrate from the diphtheria cultivation under toluol for some months,—that is, until the deterioration due to the formation of toxoids has ceased. Now, one unit of the standard antitoxin is dissolved in normal saline solution accurately measured out and made up to four cubic centimetres. This is mixed with a measured dose of the stable toxin and injected under the skin of a guinea-pig weighing two hundred and fifty grammes. Several pigs are injected in this manner, using for each one antitoxin unit, but varying doses of toxin. The smallest quantity of toxin that ensures death on the fourth day is taken as the *test dose*.

The second stage consists in mixing varying quantities of the antitoxic serum we wish to standardise, each with one test dose of toxin, and injecting the mixture under the skin of a guinea-pig of two hundred and fifty grammes. Then that dose of serum which protects the guinea-pig from death forms the “immunity unit” of the serum we are standardising.

As it is important to have a large number of units in a small quantity of serum, that which is found not to fulfil this condition when standardised is usually rejected; on the other hand, it may be concentrated by such means as evaporation at low temperatures *in vacuo* or by repeatedly freezing and thawing. As a general rule, no serum is preserved which contains less than five hundred units per cubic centimetre.

Chemical Nature of Antitoxins.—Having briefly described the method of preparation and standardisation of antitoxins, the next question that arises is what are they? As a matter of fact, we

know very little of their chemical composition. They are believed to be proteid bodies, but the facts before us are few. Antitoxins are closely associated with globulin, and if an antitoxic serum is saturated with neutral salts the precipitate of globulin carries down the antibodies also, but when carbon dioxide is used to precipitate the globulin the antibodies are destroyed. Probably antibodies possess a large molecule, as they will not dialyze, neither will they pass through a gelatin-choked filter, and in these characters again they closely resemble globulin. Antitoxins, however, are not altered by peptic digestion; this would appear to show that they are not globulin, but rather a nuclein, as the latter is the only proteid-like body in the blood which is not destroyed by peptic digestion.

Strong light—*e.g.*, sunshine—destroys antitoxins; diffuse daylight is less marked in its effect; the blue and green rays are the destructive agents, for the yellow and red have practically no influence. Air or pure oxygen has a deleterious effect. Short exposure to temperatures at 60° C. does not seem to alter the characteristic properties of antitoxin, although prolonged exposure causes considerable alteration. Heating from 60° to 70° C. (140° to 158° F.) or more, however, causes marked weakening and even destruction, according to the temperature and the length of exposure.

CLINICAL ASPECTS OF SPA TREATMENT.¹

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It is frequently affirmed by patients that they receive from a particular spa treatment benefit which they can obtain in no other way. A short time ago a gentleman informed me that he was a sufferer from neurasthenia, that he had been to the Hot Springs of Virginia, and that he had also spent some time at Aiken, South Carolina, with the hope of being benefited; but he knew of only one place where he secured treatment which was helpful and curative,—viz., at Divonne in Switzerland, where the cold spinal douches made him feel like a new man. As it was winter, I advised him to go to Lakewood, New Jersey, and see what the cold spinal douche as there given might accomplish for him. If it had been summer, I probably should have sent him to Sharon or Richfield Springs, always supposing he could not go to Divonne and could be persuaded to give one of these resorts a trial. What is true of Divonne for the patient referred to is for other sufferers true of Aix, Carlsbad, Homburg, Vichy, and foreign spas in general, not to speak of well-known places at home, like Saratoga, Bedford, White Sulphur, Glenwood, and Avon Springs.

These statements in regard to spas and their treatment, which are frequently made to the general practitioner, suggest many practical questions concerning climate, waters, baths, scene, occupation, rest, food, exercise, massage, and electricity.

It is truly affirmed that there are in the United States mineral springs excelled by none elsewhere, and yet treatment at these resorts is often unsatisfactory. Take Saratoga as an example. Is it not healthful and agreeable so far as summer climate is concerned, and are not the waters of Saratoga remarkable for their

¹ Read at the eighteenth annual meeting of the American Climatological Association, held at Niagara Falls, 1901.

variety and curative effects if *judiciously* used? Unfortunately, in the latter consideration we find a problem difficult of solution.

The average American who goes to Saratoga even for a "cure" will not or cannot secure a suitable dietary while drinking the waters, nor will he rise and retire early and walk a prescribed time each morning between his tumblerfuls of spring water. Afterwards, is he satisfied to have his breakfast consist merely of a roll and a cup of coffee, or are beefsteak, omelette, fish, griddle-cakes and maple-sugar considered indispensable, to be followed by the enjoyment of a high-flavored cigar, as he sits on the piazza with his feet in an elevated position, in a quite torpid condition? Later, perhaps, a cocktail precedes a too abundant lunch, followed at seven or eight o'clock in the evening by a dinner with sauces, sweets, and champagne. Later still, the patient again seats himself on the piazza and listens to the orchestra. After a time he becomes tired of this recreation and seeks the stuffy, ill-ventilated billiard- or ball-room, and finally retires at twelve or one o'clock. Could the health of the most robust individual be improved by such an ill-apportioned day?

Contrast the life thus briefly described with that at European spas where patients are under treatment. At these resorts the hours of sleep and exercise are rigorously enforced, also the quantity and variety of food and drink, likewise the hours of rising and retiring. On the other hand, I have known more than one person who endeavored faithfully to carry out what his physician ordered at one of our health resorts, and it proved almost impossible to do it, or, if accomplished, there was no return at all equivalent to that from a cure abroad.

Admitting that some of our spas equal those of Europe, and admitting that the same careful management of the patient becomes obligatory, could we obtain generally as good results from spa treatment at home as we do abroad? I do not believe that we could. Change of scene or of occupation and mental rest are often essential to cure. The ocean trip, going and returning, is often invigorating and enjoyable. On board ship neither telegrams nor 'phone messages are received; hence, at times, untold satisfaction. Moreover, there is a subtle influence for good in climate different from what we are accustomed to, just as there is in some mineral waters remedial power which mere chemical analysis cannot explain. Of them

we may truly say at times, as Dr. S. Wilks does of the "value of drugs," "Our knowledge of them has been mainly empirical, their mode of action being often unknown. I should still maintain, however, that our method of using them is scientific if we can say from long observation that their administration is indicated in particular cases by special circumstances." Besides, we must admit that occasionally we obtain practical results in the cure of disease that neutralize completely all preconceived notions.

Another fact which I wish to emphasize is, that the mere use of mineral waters as baths or for drinking, or both, is in many instances of much less value than guidance of the patient by the spa practitioner in other ways. Let this be well understood and we shall have less self-medication, and thus the health of fewer people will be jeopardized.

When a patient arrives at a spa, let him put himself in the care of the best, most careful, conscientious practitioner he can secure; let him ignore all the kindly, officious health counsels given by friends, and let him not consider time and opportunity wasted if his medical adviser tells him to abstain from other than most conservative treatment. And yet let him report regularly to the physician and follow his advice. Frequently it is the highest wisdom to say, "Keep on just as you are doing; make no change," rather than to order some new drug or treatment, which would be useless or harmful. Fortunately, at many European spas there are able physicians who are willing to guide patients wisely, and the latter, if they would merely heed their instructions, would obtain best results.

With respect to our own climatic resorts, there is in many instances a vacuum to be filled. Although I know of several spa practitioners who have good abilities and large and varied experience, yet, owing to the fact that our resorts are relatively of new growth and because an ambitious worker desires a city reputation, the best men, as a rule, seek our large centres of population. Except during the summer months and for a few years, with a view mainly to the direct pecuniary return, the less popular resorts are poorly supplied with cultivated physicians, and even the best known can boast of only a limited few. A change in this regard will doubtless come in time, but the time is not yet present. In time will come also a true appreciation of the real value of the spa physician, not

to change drugs or prescriptions already tried, but to be the wisest counsellor in the use of every curative agent to be found at the spa,—i.e., waters, baths, diet, exercise, massage, electricity, and rest.

A difficult matter to adjudicate in a tactful way is the following: Not infrequently a patient is sent by his family physician to a particular spa and there directed to the care of a prominent local practitioner. The latter, after careful investigation of the case, may be forced to conclude that the patient has been misdirected, and that some other spa is better suited to the cure of his ills; or, indeed, he may be convinced that no "cure" is required. An embarrassing position for him! He should give his temporary patient the best advice; he should also be loyal to the colleague who has honored him, not only by reason of courtesy and gratitude, but likewise for the ultimate good of the patient. Once let patients feel that in one way or another they are misguided or deceived, and confidence is restored with great difficulty. Again, the spa physician may recognize, and properly, that he is not the source of all wisdom, and that he may be in error as to diagnosis and treatment while the family physician may be wholly correct. It becomes the spa physician, therefore, to be cautious in statement, and not pass judgment until he has had time and opportunity sufficient to form an accurate and thorough conviction.

Many foreign spas possess an advantage over those at home in the fact that the reputation of some of their physicians has given additional fame to the spa itself. Not only have they grown gray in harness, but theirs has been a real growth, accompanied by valuable contributions to scientific or practical medicine, and not merely a passage of time. Even men of this calibre may be led into error. Patients who really require very little in the way of treatment beyond regulation of diet, rest, exercise, and sleep are advised to do what is useless or positively weakening and detrimental. In my judgment, there is little doubt that some patients have had their heart power impaired more or less permanently by excessive treatment.

Dr. Samuel Hyde writes, there is "an accumulated condition of depression" which often follows too prolonged spa treatment, especially by baths of a temperature exceeding 90° F., and this untoward result must always be considered and guarded against as

far as possible. "Conditions of heart weakness previously existing may be exaggerated or even others, before absent, may be developed."¹ Therefore, wherever a well-trained and highly trustworthy assistant cannot be had, it is wiser to abandon treatment with baths and resistance movements, "and to trust entirely to regulated walking exercise, pure fresh air, suitable diet, and drug tonics, not overlooking, of course, the psychical influences of expectancy, hope, and allayed anxiety and fear." (Hyde.)

It is evident from the foregoing how important it is to employ instructed and careful assistants, or bathers and manipulators, in spa treatment; otherwise, even in well-selected cases, our results must be unsatisfactory. Of course, the patient's physician must exercise close oversight and direct the treatment personally, as much as possible. Still, in many instances, he must rely considerably upon qualified assistants to do the right thing at the proper time, where some rapid or sudden change of symptoms or conditions occurs and until the physician can be consulted. Too active or too continuous treatment does real harm, and not infrequently patients later show signs of considerable physical depression during many weeks. The good results, after all, to be obtained from spa treatment, particularly by baths and exercises, depend largely upon the judgment and knowledge with which they are given. It is for this reason that I do not believe so much in the specific effects of certain spas in the treatment of special disorders as I do in the manner in which the resident physicians make use of their opportunities. No doubt, for example, that the methods pursued by Schott and others at Nauheim are not wholly new; no doubt, also, that they have been of great use in certain cases, and especially in showing well-trained physicians elsewhere what may really be accomplished at the spas where they practise and with waters quite different from the stand-point of chemical analysis and temperature. In other words, I am satisfied that as good results may be obtained elsewhere if only the indications so ably advocated by Schott are carried out. This fact Schott himself, to his great honor, has repeatedly emphasized.

In those cases where bad results have followed the treatment of grave forms of disease accurately diagnosed,—while it is much to

¹ Journal of Balneology and Climatology, vol. ii. p. 134.

be deplored,—it does not appear to me so regrettable as where the diagnosis is at best questionable and where, of course, the benefits of any special course of treatment must be most problematical, the cause and nature of the patient's disease being very obscure.

In the estimation of the value of spa treatment much importance should be attached to the previous habits of the patient. If they have been correct or nearly so, we shall not, I believe, get such good effects from treatment, even in well-selected cases, as we shall obtain where the habits have been improper or wrong, purely from a hygienic point of view; and this argument is readily understood without extending it. Of course, this statement would not include certain gouty patients, in whom periodic outbreaks, more or less continued, will occur, according to my experience, despite all usual treatment at home, and can only be met efficiently, if at all, by a well-ordered spa treatment.

Spa physicians are apt to specialize too much. They regard every ailment from a narrow stand-point, and believe that every patient who comes to them is suited to the treatment at the resort where they are. In this belief resides oftentimes lamentable error. Where this error, however, is lacking and there is a broad appreciation of the patient's condition, the physician may be willing, unfortunately through desire for money, to keep patients coming to him who, he knows, do not require professional care. This stigma can be guarded against solely by recognition of high personal character in the spa physician as being of primary importance, even as it always is elsewhere. In one way or another, I have certainly known several patients who seemingly have been victims. This conviction would be calculated, in the minds of physicians and patients at home, to bring the spa into disrepute, and consequently is much to be deplored. In the matter of benefits from spa treatment a wise and conservative judgment should be exercised. We should not attribute to it too much importance; we should not, on the other hand, undervalue its power for good. If we expect the impossible, of course we shall be disappointed and disposed to criticise most unfairly. Take a chronic disease of long standing, for example: should we expect, from a few weeks of baths and waters and other useful adjuncts of the most rational treatment, a complete cure? Evidently not. All we can hope for is amelioration, and that in the *régime* adopted we may afford to our patient an object-lesson which

he will try to follow so far as may be indicated and possible upon his return home.

Again, there are many who are sent to a spa for a course of treatment not because they have a well-defined, special disease to which can be given a particular name, but mainly because their whole system requires a change of life and *régime* in every way, and where "mere drugging" at home is sure to be of no material advantage and may be even detrimental. Such patients are unquestionably more benefited by a spa treatment, rightly indicated and judiciously managed whilst there, than in any other known way. The mere regulation of their habits from day to day for several weeks,—their coming back, as it were, to a physiological life, with plenty of fresh air and sunshine, moderate exercise, regulated diet, and complete freedom from worry,—whilst the emunctories of the economy are being stimulated to do good work through water drinking, baths, massage, resisted movements, etc., is productive of great good in appropriate cases.

In many of these instances—especially where the spa selected has been one whose effects, even in a moderate way, are slightly debilitating, owing to the effort made to get rid of worn-out, effete cells or retained excreta—an "after-cure" is really essential. In the first place, if for no other reason, it is rational because it lengthens a vacation which is at best none too long to accomplish the results we most desire,—viz., the complete renewal or regeneration, as it were, of the fluids and tissues of the economy. In the second place, the site of the "after-cure" is, or should be, some elevated mountain resort or sea-shore place, according to circumstances, which shall stimulate and invigorate the patient to that degree that he can return to his life's work later in the best physical condition attainable.

An "after-cure" means in reality two things,—(1) perfect salubrity of environment and (2) careful and rational habits of daily life. Of course, the best selection of a place for this so-called "after-cure" will depend much upon the nature of the ailment and the condition of the patient who has had a "cure." He should not go immediately to a very high elevation, but should seek places first of lower altitude, and, after these have been thoroughly tried, go to higher elevations if there is sufficient reason for so doing. Such action is, of course, based upon the idea that there may be some

cardiac depression after the spa treatment, and is pointed out by wise foresight, even though circulatory weakness is not always well defined at first or even existent then or later.

In addition to the foregoing, I may add two considerations of moment. First, I would emphasize the importance of a patient who goes to a spa for treatment having a detailed history from his home physician of his physical examination and of his antecedent symptoms. Without these data much time and labor are lost, and, independently of this, the spa physician is unable to obtain facts which may be compared with the preceding ones and which are often essential, so as to appreciate accurately the march and evidence of impaired nutrition or well-defined disease. Again, it is important here, as always in the practice of medicine, for the spa physician to be in sympathetic touch with his patient, and by this I mean that he should become familiar with, or recognize, his personal peculiarity or susceptibility, so as to be able at a given moment to protect him from annoyance, discomfort, or positive injury, when without this transmitted or acquired knowledge he would be working in the dark.

Such information is doubtless more important with women, young and old, than with men; and yet with many men we can do but little to help them, even in their physical disabilities, unless we acquire a very considerable control over them mentally. All good, successful family practitioners recognize the important bearing of this statement; it is none the less valuable at times to the spa physician who really desires to be useful to his patients and has a high ideal of his *rôle*.

The mental control of patients comes, in part at least, from the feeling that their own physician understands them, that he is familiar with their habits, peculiarities, and antecedents. It is desirable, therefore, if possible, other things being equal, to have medical advice from one's countrymen. Few American physicians of reputation are found at foreign spas. Therefore, except in very rare instances, advice from this source cannot be had. It is not quite so true of English physicians, and I must confess I would be prone to recommend an Englishman to my patients rather than a German or a Frenchman, if he were at all a man of equal value, on account of his nationality and because I believe he would comprehend the average American better than either of the other two.

In all instances where we send patients to health resorts we should bear in mind the importance of the condition of lungs, kidneys, liver, and skin. These organs are too often disregarded or overlooked in the counsels given to our patients, and yet we cannot too formally emphasize their importance.

I might continue in this way, but I feel that I have said enough, especially in view of my great desire. I wish to open a discussion which I trust may be fruitful of good to the city practitioner, to the resident spa physician, and, above all, to our patients.

THE INFLUENCE OF PREGNANCY ON THE PROGNOSIS AND TREATMENT OF COEXISTING ACUTE AND CHRONIC DISEASE.

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PREGNANCY may be complicated by almost any general or local disease, which will influence the normal course of the pregnancy in very variable degrees and ways, and these diseases may to some extent be themselves modified by the pregnancy. We are not here dealing with local diseases of pregnancy, due to the pregnant state itself, nor with intercurrent local diseases complicating pregnancy, but shall consider solely intercurrent constitutional diseases.

Importance of the Subject under Discussion.—The presence of an acute or chronic disease during pregnancy is so often the cause of foetal and not infrequently of maternal death, that our knowledge of what we may expect under such circumstances should be as perfect as possible. Medical men in general practice necessarily see most of such cases, while specialists in obstetrics, as a rule, see only cases threatening to terminate disastrously.

We may consider the subject under the following headings, alphabetically arranged: Albuminuria, Asthma, Cholera, Chorea, Diabetes Mellitus, Enteric Fever, Epilepsy, Erysipelas, Heart Disease, Influenza, Lead Poisoning, Malaria, Measles, Operations, Paraplegia, Pneumonia (Acute), Relapsing Fever, Rheumatism (Acute), Scarlatina, Smallpox, Tuberculosis, Typhus Fever.

There are two factors common to many of these intercurrent diseases,—(1) pyrexia, (2) toxic products.

(1) *Pyrexia.*—In maternal pyrexia the foetal heat increases *pari passu* with the maternal pulse, and the child *in utero* becomes restless. Danger to the life of the foetus seems to begin when the maternal temperature is 104° F., and death occurs when the maternal temperature reaches 106.5°.

It has been proved that the uterine temperature is one degree higher than that in the maternal mouth, and that the foetal temperature (mouth) is half a degree higher than that of the maternal uterus. The temperature in a foetal rectum, taken during the course of delivery of a presenting breech, is half a degree higher than that of the maternal vagina, and the foetal temperature at the moment of normal birth is said to be always higher than that of the mother.

(2) *Toxic and Specific Elements in the Maternal Blood.*—Experiments on animals have shown that the specific germs of cholera, glanders, septicæmia, tuberculosis, recurrent fever, anthrax, and erysipelas, and probably many other similar affections, may pass from mother to foetus through the placental circulation. The fact that one twin may be infected with the maternal disease and the other twin escape tends to confirm the view that the germs cannot penetrate through the epithelium covering the foetal villi unless the epithelium is somewhere defective.

There may not be sufficient pyrexia to destroy the child's life, and the placenta may have sufficed to prevent the maternal blood-poison from entering the foetal circulation, and yet abortion ensues. This is from the eccholic effects of asphyxia upon the uterus, especially in cases of pulmonary or cardiac disease where there is excess of carbonic acid in the blood.

ALBUMINURIA.

Albuminuria complicating pregnancy is due to two main causes, —(a) pre-existing chronic Bright's disease ("albuminuria *in* pregnancy"), (b) appearing for the first time during the pregnancy ("albuminuria *of* pregnancy"). We are here concerned solely with the first variety.

The albuminuria of chronic Bright's disease is not always readily distinguishable from that of pregnancy, but in chronic Bright's disease the urine is usually plentiful and the albumin is mainly serum albumin instead of containing much paraglobin. The history of the case is often of extreme value. The albuminuria of chronic Bright's disease is sure to increase in quantity during pregnancy and to diminish after labor. The complications of chronic Bright's disease (œdema, retinitis, high arterial tension, etc.) would also vary. Abortion not infrequently occurs in cases of maternal albuminuria, and is due either to impurity of the blood or to

serotinal hemorrhage. There seems also every reason to believe that paternal albuminuria, especially that form due to granular kidney, may be the cause of foetal death in the early months, owing to impaired vitality of the impregnating spermatozoön.

Albuminuria predisposes to accidental and post-partum hemorrhages as well as to puerperal septicæmia and to mania.

Puerperal eclampsia is not very common as a complication of pregnancy with pre-existing chronic Bright's disease, but has to be considered in the prognosis and treatment

Treatment.—Women with chronic Bright's disease should be discouraged from marrying. If married, and there is distinct evidence of progressive kidney disease or of secondary complication, maternity should, if possible, be prevented.

The albuminuria due to chronic Bright's disease should be regarded with grave suspicion, and all efforts made to relieve the kidneys of extra work by acting upon the bowels and the skin, by restricting the diet mainly to non-nitrogenous food, and by giving plenty of milk and diluents to encourage flushing of the kidneys and to dilute any poison present in the blood.

A mixture containing perchloride of iron, solution of acetate of ammonium, and sulphate of magnesium has proved valuable in the author's hands.

If in the progress of the case the albumin be increasing and the urea diminishing, and especially if œdema, retinitis, or epigastric pain develop, abortion should be induced, lest the more serious complication of eclampsia should follow.

ASTHMA.

Three cases are recorded by Halliday Croom, two cases by Chambrelent, and five by Audebert. The following conclusions may be deduced: The disease doubles its intensity during pregnancy, and during the confinement the attacks may become particularly violent. The prognosis is serious for the mother (one death in seven cases) and also for the infant (two deaths). Contrary to what one would suppose, even very violent dyspnœa does not bring on uterine contractions. Three reasons are suggested to account for the attacks: pressure on the lungs, irritation of the pneumogastric, and a kind of "menorrhœa." Whatever may be the pathology, the most effective treatment appears to be the administra-

tion of morphine and quinine. Obstetrically, it is best by inducing labor to deliver the infant as quickly as possible; if urgent symptoms arise or if labor spontaneously ensues, the membranes should be ruptured as soon as the os uteri is dilatable.

CHOLERA.

Abortion almost invariably ensues, except in the mildest cases and in those who die too soon for abortion to take place. The maternal mortality is about fifty per cent. In one hundred and eighty-three cases given by Charpentier, there were one hundred and four maternal deaths, whilst ninety-five of all the cases aborted. Of those that aborted forty-six recovered. This latter circumstance is explained by the fact that many of the fatal cases died so quickly that no time was afforded for abortion to take place.

Asphyxia is probably the cause of the abortion when the child is born alive. Abortion is often preceded by internal hemorrhage, which is said to be inflammatory, but is probably due to systemic congestion.

No cholera-bacilli have yet been found in the foetal blood, though experiments on animals have shown that these germs are transmissible from mother to foetus.

CHOREA.

Chorea in pregnancy is characterized by irregular spasmodic movement, incoördination of voluntary movement, and often by muscular and mental weakness. Very few cases are recorded of women who have become pregnant whilst affected with chorea; but pregnant women, up to the age of twenty-seven, with the unstable or impressionable nervous system peculiar to pregnancy or who have had rheumatism (thirty per cent.) or who in childhood have been choreic (thirty-three per cent.) may develop this condition, which is usually of a very severe type, the mortality being as high as twenty per cent. Many mild cases, however, do not get reported.

The exciting cause is often a fright or a nervous shock during the early months of a first pregnancy, or at about the date of quickening. It may recur in subsequent pregnancies.

Chorea is not associated with albuminuria. It may be unilateral, but is usually general. Mental confusion or even mania or paralysis may be associated with it, and, as a rule, the choreic

movements then get less marked, as if there had been a variation or exchange of the channel by which the nerve-force is discharged. When severe, it deprives patients of sleep and prevents due nourishment being taken, and so speedily induces exhaustion.

In cases where the movements are continuous the *fœtus in utero* soon succumbs, and there is evidence that the uterus becomes tolerant of its presence and does not throw it off, auto-intoxication occurring in many recorded cases. Some have explained the occurrence of mania in this way.

Treatment.—Most of the ordinary drugs used for chorea fail to influence the disease when it occurs during pregnancy. Even morphine may fail to induce sleep. Conium, chloral, and hyoscyamine may temporarily soothe, but in severe cases nothing but continuous chloroform anæsthesia suffices to check the muscular twitchings. To cure the disease, abortion or premature labor is necessary, and should be induced as early as it becomes evident that the sedative effect of drugs lasts only during their administration and is in no sense curative. If there be evidence that the *fœtus* is still living, Cope-man's method of digital dilatation of the cervix should be adopted (as recommended by him for the treatment of the uncontrollable vomiting of pregnancy) before definitely inducing abortion. Spasm of the circular fibres of the cervix at the level of the internal os uteri has often been noted in these cases as well as in hyperemesis. If the membranes be found ruptured and especially if there be an offensive discharge, the uterus may at once be emptied. If the membranes be intact, an interval should be allowed to elapse after the digital dilatation, to see if improvement occurs, and if the choreic movements continue, abortion must be induced without further delay.

As a rule, there is some rise of temperature after the abortion has been induced, apparently from auto-toxæmia, but the choreic movements get feebler and feebler, and in a few days cease, some disturbance of intellect often persisting for two or three weeks.

Mild cases are best treated with chloral in large doses, with the addition of three or four grains of antipyrin, to ensure sleep at stated intervals. Hyoscyamine in doses of one-fifteenth of a grain hypodermically has a well-marked sedative effect, but rarely induces sleep.

DIABETES MELLITUS.

Putting aside cases of transient glycosuria from suppression of lactation, diabetes, with definite diabetic symptoms, is a very dangerous complication of pregnancy. Premature labor takes place in thirty-three per cent., almost always after the twenty-eighth week, the child dying *in utero*. In severe progressive cases it takes place in fifty per cent., owing to diabetic coma or to acute or subacute pulmonary lesions supervening. In such severe cases hydramnios is common, and sugar is usually found in the liquor amnii.

In cases of diabetes where sugar is moderate in amount and not increasing, and the patient is otherwise in good health, the danger does not appear to be as great as was at one time believed.

Diabetes in the father is stated by Priestley to lead to such impaired vitality of the impregnated ovum that frequent abortion may ensue.

Treatment.—The mild cases require no treatment except dieting, but if the glycosuria is daily increasing, the pregnancy should be ended before coma or pulmonary complications arise. If possible, suckling should be encouraged.

ENTERIC FEVER.

Rokitansky believed that pregnancy gave a sort of immunity from typhoid, and, although Jenner and Murchison disagreed with this view, it seems probable that a pregnant woman is less liable to be infected, at all events in the late months, for the great majority of cases of typhoid in pregnancy occur in the first half of gestation. Typhoid during the latter months is probably more serious than in the earlier months.

Abortion or premature labor occurs in sixty per cent. of the cases, as shown by the following statistics.

	Cases of Typhoid in Pregnancy.	Abortion or Prema- ture Labor.
Charpentier	324	205
Sacquin	310	199
Martinet	109	66
Weber	63	23
	<hr/> 806	<hr/> 493

As the great majority of cases occur in the early months of gestation, abortions are necessarily more frequent than premature

labors; thus, of Charpentier's three hundred and twenty-four cases, there were eighty abortions to thirty-three premature labors, the details of ninety-two other cases of interrupted pregnancy not being given.

Pregnancy does not appear to influence unfavorably the course of enteric fever; indeed, the author has observed several cases which tend to show that if abortion takes place, as it often does, about the tenth or fourteenth day, the fever may drop almost suddenly to normal or have a much smaller range at a lower level.

Fordyce shows that typhoid is transmissible to the *fœtus in utero*. A patient had labor induced at the fifth month, hoping that her very grave condition from enteric fever would improve when the uterus was emptied. She died, however, eighteen hours after delivery. Eberth's typhoid bacillus was found in the fœtal blood, Widal's agglutination test gave positive results, and cultures were successfully made. Similar results had been shown by Retier in 1885, by Neuhass in 1886, by Widal in 1887, by Eberth in 1893, and by Freund, Siglio, Ernst, and others, and from these cases Fordyce believes that, although the fœtus would usually die and be prematurely expelled if thus infected, it may survive infection, pass through all the stages in utero, and be born healthy.

Treatment.—There appears to be no reason to interfere with the pregnancy in these cases, but every effort should be made to facilitate the delivery when labor has started, to save all prolonged and unnecessary muscular strain, and to be scrupulously careful as regards antisepsis.

EPILEPSY.

True epilepsy is rare in pregnancy. It may be distinguished from puerperal eclampsia by the "cry," the single fit, the absence of pyrexia, the absence of albuminuria, and the short period of coma.

Epileptic fits are less frequent when a woman is pregnant. Epileptic patients are not more prone to puerperal eclampsia than other women. Labor proceeds normally.

A few cases are on record where true epilepsy (without albuminuria, etc.) has occurred only during pregnancy, the fits ceasing during and after labor, but reappearing at the next pregnancy. Maternal epilepsy has been known to cause fœtal death, but is clearly not as dangerous to the fœtus as true eclampsia.

ERYSIPELAS.

Erysipelas almost surely leads to premature delivery of a dead foetus, owing to the pyrexia and constitutional disturbance. As regards the mother, however, it has a less serious aspect than either smallpox or scarlatina. During pregnancy erysipelas runs a slower course, but seems to be more difficult of control, and recovery from it is less frequent than in cases uncomplicated by pregnancy. When present during the puerperium, the vulva and genital tract may become infected, and death is almost inevitable.

Schäffer says the transmigration of the erysipelas cocci of Schleiser to the human foetus *in utero* has not yet been proved, but is very probable, and infection has been demonstrated experimentally in animals.

The *treatment* of erysipelas during pregnancy is exceptional only in the special antiseptic precautions which should be adopted in regard to the genitals. The nurse who dresses the parts affected by the erysipelas should have nothing to do with the reproductive tract. This is obviously a matter of life and death after the birth. The new-born child must be at once taken away, lest its umbilicus should become infected.

HEART DISEASE.

If valvular disease is compensated for by cardiac muscular hypertrophy, which is always present to some extent in pregnancy, gestation may proceed normally, but the tax on the heart may lead to much puerperal debility; if, however, the heart muscle is degenerate, failure is soon caused by a prolonged labor, and puerperal infection often follows, owing to the diminished power of resistance of tissues nourished by blood containing excess of carbonic acid. If heart failure be present before conception, the symptoms will become more marked, and abortion or premature labor ensue.

Often premature labor is spontaneously induced, time after time, and each succeeding pregnancy is complicated by more serious compensatory disturbances, such as anæmia, debility, œdema, albuminuria, or acute nephritis. The venous blood seems to be the cause both of the uterine ecbotic action and of the death of the foetus, by leading to small extravasations of blood, which gradually separate the ovum, detaching the chorionic villi from their vascular connection with the maternal circulation.

The time of greatest risk is the first day or two after labor, especially if it has been prolonged. At first, as a result of the loss of blood and of diminished vascular tension and absence of effort, there is symptomatic improvement; but often at the end of twenty-four hours, or even earlier, the heart seems to lose all tone, and the patient suffers from severe progressive dyspnoea, with rapid, weak pulse, becomes deeply cyanosed, and gradually or suddenly succumbs. Mitral stenosis is the form of valvular disease which is most serious in pregnancy, especially during labor, the right ventricle becoming over-distended, which often leads to a fatal issue.

Sometimes mitral regurgitation is of grave import, especially during the puerperium. The mortality is high, excluding mild cases where there are no symptoms. Out of one hundred and fifty-seven cases collected by Rosenberg, of New York, eighty-one died (over fifty per cent.).

Treatment.—Rest must be insisted upon, its degree, partial or absolute, to be judged by the compensatory disturbances present and the effect of moderate exertion. Purgatives, strychnine, iron, with digitalis or strophanthus, in some cases of mitral disease, may be judiciously administered.

Labor should be encouraged in the sitting position, and, if it can be safely done, should be expedited, by rupturing the membranes when the os is dilatable, to shorten the second stage and to relieve abdominal distention and upward pressure on the diaphragm. To lessen the patient's efforts, forceps may be applied early, with slow delivery, under ether anæsthesia, thus reducing the waste products of muscular action, shortening the time of straining, and to some extent preventing the reflex holding of the breath during the pains. If the kidneys are affected, chloroform anæsthesia seems preferable to ether.

Berry Hart and Spieselberg have shown that there is great danger (whether primarily due to valvular disease or to muscular disease) of distention of the right heart, and deprecate giving ergot to lessen the tendency to hemorrhage, which is beneficial unless excessive. Indeed, some observers advocate giving amyl nitrite to relax the uterus and relieve spasm, and so encourage moderate post-partum hemorrhage.

It is rarely necessary to induce labor till foetal viability (twenty-eight or thirty weeks). Statistics (Schlayer and Phillips) show

that the maternal mortality of such premature induction is very high, seventy per cent. dying during the puerperium. Possibly earlier interference would have had better results; but, as a rule, it is better to leave the onset of labor to nature, and reserve our efforts to helping the mother during the labor itself, for, although the heart will certainly not improve till after delivery, the risks during the puerperium have in all cases to be faced. If interference is effected only when critical symptoms, due to auto-intoxication and engorgement of the circulation, arise, the result will usually be fatal. Women with heart disease without a capacity for compensation of the heart should not marry, and should not become pregnant if married.

INFLUENZA.

The effect of influenza on the course of pregnancy depends entirely upon the severity of the disease. Felkin, Cazeau, and Lusance maintain that influenza frequently causes abortion; others contradict this. There is also a diversity of opinion about the danger to the mother. In an epidemic in the Leipsic clinic the mortality was heavy (three out of eight patients died), whilst in Munich, and in an epidemic in Paris where almost all the women were affected, the pregnancies continued with very few complications and no fatalities. The differences of opinion no doubt depend upon the severity of the disease, and especially upon the fact whether pneumonia supervenes.

There seems to be reason to believe that pregnant women are somewhat immune from influenza, for such a complication is rarely seen, and lying-in hospitals in England have almost always escaped the disease even when influenza has been raging all round.

During the puerperium, influenza has to be distinguished from septicæmia, and may for a time cause anxiety for that reason.

Treatment.—No interference with the course of pregnancy is recommended.

LEAD POISONING (CHRONIC).

This is an undoubted cause of early foetal death, and is one of the four diseases (syphilis, Bright's disease, diabetes, and plumbism) which, even when the father only is affected, may so impair the foetal vitality that early intra-uterine death occurs. Thus, in seven women whose husbands suffered from lead poisoning there were thirty-nine pregnancies; of these eleven ended in abortion and one

in premature labor, and of twenty-seven children born alive eighteen died in early infancy and only nine survived.

Women affected with lead poisoning are often also affected with chronic Bright's disease, and almost always abort.

Treatment.—The pregnancy may be disregarded and the lead poisoning alone energetically dealt with.

MALARIA.

Pregnant women are not protected from malaria by their pregnancy, but are rarely exposed to primary infection. Acute exacerbations of chronic malaria are, however, not infrequently observed, and run an ordinary course, so far as the mother is concerned. The foetus may die and be expelled if there is high fever, especially in the late months, and may itself become infected through the placental circulation. In a series of one hundred and fifty-eight cases in the early months of pregnancy there were twenty abortions, whilst in a similar series in the latter half of pregnancy premature labor occurred in one hundred.

Cases are recorded in which both mother and foetus were affected by tertian ague; the attacks were usually synchronous, but it is said that they have sometimes alternated. In other cases a living child with enlarged spleen has been born prematurely and has manifested tertian or quartan ague synchronously with the mother's attack.

Treatment.—Quinine is, of course, the means of both preventing and curing malaria in all such cases, and every pregnant woman should, if obliged to be in a malarious district, take quinine daily, and also protect herself from mosquitoes by screens and by the other measures which Drs. Manson, Ronald, Ross, and others have shown to be so essential. As quinine has no effect on the pregnant uterus till parturition has begun, its use is not contraindicated.

MEASLES.

Measles being a disease of childhood, pregnancy is seldom complicated with it, and, unless the accompanying bronchitis is severe, its effects on the mother are not serious. Towards full time, however, when there may be already much subdiaphragmatic pressure, the bronchitis may form a very serious complication. In forty or fifty per cent. of such *severe* cases abortion or premature labor follows. Children have been born with the typical rash upon them or

have developed it in a day or two, proving initial uterine infection. Gautier noted this eruption in six out of eleven cases, the maternal mortality being two.

Treatment.—The chief indications are to control the cough and keep the temperature low. There need be no interference with pregnancy, but, if labor result from asphyxia due to the bronchitis, the membranes should be ruptured to relieve tension.

OPERATIONS DURING PREGNANCY.

In the old days, before antiseptics, pyrexia usually followed operation and led to foetal death and emptying of the uterus. Nowadays the result of the operation depends upon three factors:

1. *Systemic shock.* This is relatively non-existent, owing to anæsthesia and the reactionary measures subsequently adopted,—*e.g.*, saline injections.

2. *The effect of the anæsthetic.* If ether or gas and ether are pushed too long or too rapidly, there seems to be a real danger of asphyxia causing ecbolic uterine activity.

3. *Direct or indirect effect of the operation on the uterus.* Without anæsthesia an operation on the perineum or rectum often caused abortion. Now uterine polypi or ovarian cysts can be removed, and even intramural fibroids may be enucleated, without abortion ensuing.

PARAPLEGIA.

The author has collected details of cases and experiments which prove that in pregnant women affected with paraplegia, from either injury or disease in the dorsal region of the spinal cord, labor may commence at the normal period of gestation, and may progress in an approximately normal manner, but without sensation of pain.

Direct communication with the brain is not essential to coördinate uterine action, though the brain seems to have a controlling influence upon the pains, helping to make them regular, with well-defined intermissions.

Direct communication between the uterus and the lumbar enlargement of the cord, through the medium of the sympathetic ganglia between the first and third lumbar, is probably essential to the regular and coördinate contraction and retraction of the uterus, as occurs in normal parturition.

It seems also probable that the uterus is able automatically to

expel its contents as far as the relaxed part of the genital canal, even when deprived absolutely of spinal influence, spinal reflexes being then necessarily absent.

Involution and lactation are also normal.

Treatment.—No interference with the pregnancy is required.

PNEUMONIA (ACUTE).

Acute pneumonia is very fatal. Recovery is very rare if abortion or premature labor result. Wallich states that abortion occurs in thirty-three per cent. of all cases before the sixth month, and premature labor in sixty-six per cent. of all later cases. These cases would be almost invariably fatal. In one hundred and ninety-seven cases pregnancy was interrupted in one hundred and four, with a maternal mortality of seventy-five per cent. In cases not thus interrupted the mortality is eighteen or twenty per cent. The author has never seen a case recover where premature labor had spontaneously occurred. Usually the abortion takes place during the height of the disease, when dyspnoea is severe and the patient is drowsy or semiconscious, and generally without previous warning if the gestation is under three months. In early cases and even up to six months the child is often born with unbroken membranes. The loss of blood temporarily relieves the systemic and pulmonary congestion, but in twenty-four hours or less the urgent symptoms recur and death ensues.

In one case of right pleurisy and pneumonia seen by the author the improvement continued for three days and hopes were entertained that recovery might occur, but abdominal symptoms supervened and the patient died. At the post-mortem it was found that she had developed acute perihepatitis and localized peritonitis. The pelvic peritoneum was healthy.

Probably the pyrexia and the venous state of the blood tend to destroy the life of the foetus, and the asphyxia tends to cause the uterus to contract and expel its contents in this almost painless manner.

Treatment.—This should be similar to that in ordinary pneumonia as regards the chest affection. The opinion that premature labor should not be artificially induced is fairly well established.

If during an attack of pneumonia after the third month of gestation uterine action is observed, labor should be expedited by rup-

turing the membranes to relieve local tension and dyspnœa, but care must be taken to avoid too rapid emptying of the uterus, as severe post-partum hemorrhage is stated to be not uncommon in such cases.

RELAPSING FEVER.

Patients almost invariably miscarry. Of thirty-six women all miscarried except one (Smith and Jackson). The child, if viable, is usually stillborn.

RHEUMATISM (ACUTE).

Cases have been recorded of acute rheumatism during pregnancy, and in almost all cases abortion has come on after some hemorrhagic discharge. It is probable that the high temperature is the cause of the foetal death. The course of the acute rheumatism does not differ from the ordinary.

SCARLATINA.

Scarlatina may in exceptional cases complicate pregnancy, and then precipitates labor. In a severe epidemic in Vienna in 1801, all pregnant women miscarried and most of them died. The liability to infection is, however, especially marked shortly before and during the first week after delivery, and at these times the incubation period may be shortened.

The mortality of scarlatina in pregnancy is very high, owing chiefly to the great danger of renal complications. Denham had one recovery in eight cases, Braxton Hicks four in eighteen, McClintock ten in thirty-four; but during the puerperium scarlatina seems less virulent and "breeds true," pursuing its ordinary course, and not producing puerperal septicæmia. A pregnant woman is less susceptible to the infection of scarlatina, and, if exposed to infection during pregnancy, some believe that the incubation period may be prolonged till the confinement, but there is no *direct* evidence to this latter effect. It is a fact, though, that scarlatina during pregnancy is very rare and yet is fairly common during the puerperium. Olshausen was able to collect only seven cases during pregnancy, whilst he collected one hundred and forty-four during the puerperium, sixty-two of which developed on the first or second day, and twenty-seven on the third day. The mortality of these eighty-nine cases was large,—viz., forty-nine, or fifty-four per cent.

Scarlatina is said (by Boxall) to be modified by pregnancy as

follows: Throat-symptoms are well marked during pregnancy, but are slight after delivery. When labor occurs during the incubation period, it is uneventful, though mental excitement may be more marked and inertia uteri may supervene late in labor. When labor occurs during the attack itself, inertia sets in early, and post-partum hemorrhage is liable to occur. Mammary secretion is much diminished during scarlatina.

Treatment.—No interference with the course of pregnancy is indicated; but if labor supervenes all effort on the part of the patient should be minimized, and the child, if living and free from rash, should be at once isolated.

SMALLPOX.

Smallpox generally leads to early interruption of pregnancy. Abortion is generally brought on by hemorrhagic decidual endometritis.

Serres, quoted by Charpentier, states that in twenty-seven cases of pregnancy complicated by smallpox there were twenty-three abortions and twenty-two maternal deaths. Caseaux states that abortion takes place at the suppurating stage of smallpox, and if at a late stage of pregnancy, the fœtus may be expelled living or dead. Fœtal death may be due to specific or secondary poison in the blood, or to maternal pyrexia, or to interference in the placental circulation by the presence of a hemorrhagic endometritis. Occasionally the fœtus is found gangrenous if abortion is delayed.

Maternal mortality, when the smallpox attacks women during parturition, is fifty-nine per cent.

The fœtus in utero may become infected, and be born with pustules, usually at an earlier stage than those on the mother, though cases are recorded of the pustules on mother and child being at the same stage. The epithelium covering the placental villi, therefore, does not always prevent the transmission of the specific germ. Indeed it is possible for one twin to be infected in utero whilst the other escapes, and Dr. F. A. King, of New York, states that when the mother is protected by a previous vaccination or a previous attack of smallpox, the child in utero may have smallpox and the mother escape.

Treatment.—In an epidemic of smallpox all pregnant women should be vaccinated, but opinions differ as to whether the child is thereby protected also, and most authorities agree that the child of

such a mother should be vaccinated as soon after birth as its vitality permits.

In other respects the treatment is the same as in scarlatina.

TUBERCULOSIS.

It is uncertain whether the spermatozoa of a tubercular male parent can simultaneously fertilize and infect a healthy ovum. Probably not, although male patients with advanced general tuberculosis have been proved to excrete bacilli with the semen.

Bacilli of tubercle have practically never been found in the ovaries of tubercular women who have become pregnant, so that the infection is almost certainly conveyed through the placental circulation. This has been proved in advanced cases of general tuberculosis (Hauser).

Pregnant women with tuberculosis improve in every way during pregnancy, whilst all organs are, as it were, on the up-grade; but after parturition (especially if lactation is permitted), when degeneration of the hypertrophied organs is in progress, there is usually a very rapid recrudescence of the disease, with a hectic temperature.

The milk of tuberculous women has in only a few instances been found to contain bacilli, but it is well known that the milk of such patients is not very nourishing, so that from the point of view of both mother and child weaning is advisable.

Treatment.—Tuberculous women should not marry, and if married they should not be allowed to conceive. Both of these prophylactic steps are under present circumstances often impracticable, especially as, unfortunately, tuberculous women appear to conceive with special facility.

Preparation for the inevitable decline of the mother's health after the confinement must be made, by suitable diet, hypophosphites of iron, etc., cod-liver oil, and malt. Lactation should be prohibited. The infant should be brought up "by hand" or by means of a healthy wet-nurse.

It would rarely be justifiable to induce abortion or premature labor. Abortion should not be induced because of the probability of the *child* being tuberculous, but should in all cases be procured only to save the *mother's* life after careful consideration of all the particular circumstances. It must be remembered also that the patient will go rapidly downhill just as much after an induced labor as after a spontaneous one, or even more so.

TYPHUS FEVER.

Murchison stated that the course of pregnancy in typhus was rarely interrupted, and that if labor came on the child usually survived; but Rosinski states that this is not so, and shows that abortion is frequent, that, as a rule, the fœtus is dead, and that typhus bacilli have again and again been found in the organs of the fœtus.

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GONORRHŒA AND MARRIAGE.

A SPECIAL ARTICLE.

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WE have in recent times learned that gonorrhœa, far from being the insignificant disease that it was formerly thought to be, a sort of inevitable contagion that nearly every one had to pass through, is one of the most serious pathological conditions that afflict the human race. We know now that this presumably negligible disease has more to do with the limitation of population than almost any other single factor. In gynæcology gonorrhœa takes the foremost place in etiology. Most of the serious inflammatory conditions which occur in the tubes and ovaries of women and which necessitate surgical intervention are due to the presence of the gonococcus. It is, then, the plain duty of the physician to study this serious condition and to determine the means by which the ravages of the diplococcus of Neisser can be limited.

In many cases women become infected with gonorrhœa innocently: conjugal relations are responsible for its origin. Sometimes the husband conveys the infection without knowing that he is capable of doing so, and he may even be suspicious of his marital partner because of the consequences of his own act. Much of this is due to ignorance on the part of the general public; some of it is owing to the fact that even physicians do not fully recognize the significance which gonorrhœa has acquired in recent years. Since the discovery of the gonococcus by Neisser we have been able promptly to settle many problems that seemed insoluble before with regard to the etiology of discharges of various kinds and from various organs. It is our duty now to spread broadcast the knowledge that we have gained in this respect, so as to leave no opportunity for ignorance in such vital matters to work further harm.

The more I consider the present status of specialists' knowledge

with regard to gonorrhœa the more I am convinced that we must no longer remain silent concerning the dangers of this disease. It is only when we shall be able to bring the light of publicity to bear on this question that we can with certainty avoid the unfortunate mistakes and even serious accidents that sometimes result from well-meaning ignorance. When the dangers of gonorrhœa become generally known, its occurrence in an individual contemplating marriage will be examined into quite as carefully as now is, for example, the mental condition of the ancestors of the contracting parties or the existence of epilepsy or syphilis or any contagious disease.

With regard to gonorrhœa and marriage there are three periods which must be taken into consideration,—the period before there is any engagement of marriage, the period after the engagement is announced and the marriage-day settled upon, and the period after marriage. It is a fortunate circumstance for a man if when his urethral blenorrhagic discharge begins he is free from every obligation and can give himself as much time as is necessary to assure thorough treatment and complete cure of the disease. Where there are no disturbing sources of worry the efficacy of treatment is much more assured.

Clinical experience shows that the cure of gonorrhœa is most rapid and most complete in those who are least under the necessity of having their urethral discharges terminate in a definite time. On the other hand, patients who feel that they must be cured before a certain date are seldom spared any of the complications of the disease, and in their worry and mental disturbance are apt to employ all kinds of remedies and every method of treatment in the hope of securing rapid relief, with the inevitable result of lengthening, rather than shortening, the course of the disease. Even patients who give themselves up to treatment very satisfactorily are often disturbed by the gloomiest thoughts, and their cure is thus seriously delayed. The melancholia of gonorrhœal patients often takes the form of repentance and remorse. There is nothing that turns the ordinary young man's mind more seriously to thoughts of a future virtuous life than a persistent urethral discharge.

The realization too that he must keep regular hours and deny himself many of the associations to which he was previously accus-

tomed is apt to throw considerable time on the young man's hands, during which some member of his family, especially here in France, in order to divert his mind, is very likely to advise his meeting with social acquaintances more than before. His mother is apt to say that since her son has taken to keeping regular hours, it is evident that he has sowed his wild oats and it is time for him to get married.

It is just then, during the course of a long-standing gonorrhœa, that a young man is likely to be most tempted to enter the married state. It is important, then, that patients should be warned, from the very beginning of their treatment, that marriage is out of the question for some time, at least until all signs of their discharge are past. More than this, it is important that they should keep themselves as free as possible from social obligations, and the paying of attentions to a young woman is one of the things that they must deny themselves until the time of treatment is over, unless they would have their discharge continue for a longer period than would otherwise be the case.

GONORRHŒA AFTER THE FIXING OF THE MARRIAGE-DAY.

There are undoubtedly men—though, fortunately, few in number—who are so lost to all sense of honor as to be ready to enter on the marriage contract while they realize that they are yet in the midst of an incompletely cured attack of gonorrhœa. It may be that most of them are too cowardly to break their engagement or to put off the marriage-day after it has been once definitely decided upon and the preparations are well under way. It must be remembered that there are a good many things that serve as incitements to sexual divagations during the period of an engagement. It is not unusual for a gonorrhœa to develop or an old urethral discharge to relapse during the latter part of an engagement. In this case the bridegroom to be, completely upset, worried half to death, comes to the specialist and demands that, if possible, he shall be cured at once, or, at most, that not more than a few days shall be consumed in making him perfectly well again.

In these cases the patient often talks as if he realized nothing of the seriousness of the disease. He pretends not to understand that it is impossible for him to be cured at once, and may even eventually swear in a pathetic fashion that he sees nothing for it

but to put an end to his existence in case he cannot be cured in the interval that is left him before he is married. If you at once announce to him, as will usually be necessary, that marriage at the time mentioned is for him out of the question, that cure cannot be promised in the short time allowed, and cannot even be hoped for under the most favorable conditions, and then add that he must begin preparations to secure the putting off of the marriage-day, there is sure to be a scene. His answer is apt to be eventually, "Doctor, it is evident that you don't understand the position that I am in. We may as well not speak at all of what you wish me to do. The family preparations are all made. Our parents and relatives have come, some of them from a distance, and only a serious accident or perhaps my disappearance can prevent the celebration of the marriage at the date mentioned." You may rest assured that your patient has not the slightest desire to disappear, and that he will not do so. After a while he is apt to argue that the condition is not so serious, and that, besides, knowing his condition as he does now, thanks to your insistence, he will protect his wife after marriage, and there need be no fear of serious results to her. He is apt to seek for consolation from the physician in this point of view, and to look for encouragement in his rather chimerical scheme of allowing the marriage to proceed, yet guaranteeing protection to his wife.

The popular opinions of the present day with regard to gonorrhœa, and the views of the generality of people, who consider it an apparently insignificant, entirely local affection, are responsible for the failure of patients to realize the dangers that it brings with it. It has been rather the custom in certain circles to laugh at the disease and to regard it as of scarcely more importance than any other mucous discharge,—for instance, a cold in the head. These false notions weaken the force of the physician's insistence on the necessity for postponing marriage.

The false popular impression with regard to gonorrhœa is really due to the fact that it is only in recent years that physicians themselves have come to recognize the real significance of this malady. Popular judgments with regard to disease are much more frequently than is usually believed a reflection of our opinions as medical men. Usually popular medicine is far behind the position occupied by the medical profession at any moment, and so seems rather absurd.

Undoubtedly a time will come when the present day pessimism of specialists with regard to the cure of gonorrhœa will gain acceptance among the general public, though by that time very probably remedial measures will have been discovered which will prove efficacious for the cure of the disease.

Under present conditions it must not surprise us too much if the patient should say (I have heard such expressions more than once), "Heavens above! doctor, I have had gonorrhœa half a dozen times myself, and haven't died from it. Even though my wife should contract an infectious discharge, this unfortunate event would not produce nearly as much scandal as the postponement of my marriage under present circumstances." In such cases the only answer is, "It is my serious opinion that it is a matter of plain duty for you to postpone the celebration. You are under this necessity not only for the sake of your future wife's health, but also for your own health's sake."

It will probably be necessary then to give the particulars of the dangers that lie before the wedded pair. There is, first, the health of the young wife, with the risk that she may suffer from serious symptoms for years. More than this, the disease may make it practically impossible for her to be around on her feet for months at a time, she may be permanently childless, and may eventually die from involvement of her internal organs. As is well known by every gynæcologist, this is no exaggerated picture. That most of the gynæcological disorders are due to the gonococcus we have known for years. Unfortunately, the knowledge which the medical profession has acquired has not yet spread much outside the profession. As a rule, then, these declarations will usually be so many revelations to your patients.

Much can be added to the persuasiveness of the physician's words by making it clear to the patient who proposes to marry that the sexual relations of wedlock will almost inevitably work serious damage to himself. The excitement and sexual excess following marriage will almost surely lead to the development of serious complications. Inflammation of the epididymis, of the seminal vesicles, of the posterior portion of the urethra, and of the neck of the bladder is practically certain to follow the frequent hyperæmia due to sexual excitement. Needless to say, these complications may lead to serious permanent results that will, for

instance, destroy the power of procreation and eventuate in long-standing chronic genital disorders. Such considerations have great weight. Besides, the man must be warned that the infection of his wife will almost surely produce in her a chronic gonorrhœa. From this he will himself after a while become reinfected, and then he may reinfect in turn. The histories of such households, where infection and reinfection follow one another, are not unfamiliar to the experienced genito-urinary specialist, and the difficulty of eradicating the disease in both parties is one of the most perplexing therapeutic problems that come to the specialist for solution.

Of course, the patient must be treated at once and as effectively as possible. If the gonorrhœal discharge is recent, the so-called abortive treatment should be given a thorough trial, though it is extremely difficult to choke off a beginning gonorrhœa. There are no lack of abortive methods, but it is needless to say that success does not often follow the best-planned efforts nor the most highly recommended methods of treatment in this matter.

The injection of a solution of silver nitrate, one to twenty in strength, is a remedy that rejoices in an old and well-deserved reputation for aborting gonorrhœa. I have often used it for this purpose with excellent result; I also frequently saw it prove eminently satisfactory in the hands of my old master Didays, who had almost unlimited confidence in it. The special advantage of this treatment is that in three or four days after two or three injections the disease may be completely conquered, and then the marriage question is settled once and for all. In case the silver nitrate treatment fails of its purpose, at least the gonorrhœa is not rendered worse, and we are in a position to use the ordinary remedies for the disease at will. Despite the great advances in therapy, especially in genito-urinary diseases, that have been made in recent years, silver nitrate is yet the best specific remedy for gonorrhœa.

For success in the abortive treatment, however, it is absolutely necessary that the injections should be administered at the very beginning of the disease, when the urethral secretion is opaline and not distinctly purulent, and also while it is yet strictly limited to the fossa navicularis. If strong solutions of silver nitrate are used when an acute gonorrhœal attack is at its acme of purulent

secretion and inflammatory irritation, accessory inflammatory irritation will surely result.

Once the gonorrhœa has become freely purulent, then recourse must be had to irrigation with solution of potassium permanganate or corrosive sublimate, and the use of either of these remedies constitutes the most promising treatment of the disease. If it is possible to employ Janet's method, consisting in intravesical irrigations which wash out the urethra completely from an early stage of the malady, the physician is fulfilling the best conditions for the specific treatment of the inflammation and is doing what is most surely calculated to prevent its spread. The fluids which are employed for irrigation may vary in different cases. A permanganate solution of from 1 to 5000 to 1 to 2000 (0.20 to 0.50 gramme to the litre) is usually used at the beginning, and exceptionally its strength may be increased to 1 to 1000 or even to 1 to 500 (one or two grammes per litre). The sublimate solution should not be stronger than from 1 to 20,000 to 1 to 5000 (0.05 to 0.2 gramme per litre). The more concentrated solutions should only be employed after weaker ones have proved absolutely unirritating. They are used warm,—that is, about the body temperature. Cure is usually obtained in from twelve to fourteen days. The termination of the disease, however, does not follow any definite rule. I have seen again and again, despite the most careful regulation of the irrigations and in spite of their frequent employment and of the use of plenty of water internally as well as of the balsams, a gonorrhœa go on its course seemingly uninfluenced by all therapeutic efforts.

A number of other remedies have been very successfully employed by some specialists, and many of them bring success where the ordinary methods fail. As a rule, however, they are less sure in their results than those that have been mentioned above. My own favorite treatment comprises frequent astringent injections in connection with large doses of the balsams internally. I lay great stress upon the employment of the balsams, because, owing to the introduction of a large number of remedies for gonorrhœa in recent years, they have lost something of the reputation they enjoyed among the older specialists. They are, however, very useful, and should never be forgotten, especially when a gonorrhœa has settled down to run a chronic course.

For stopping discharge, no matter in what period it may be,

Chopart's mixture has maintained a high reputation for more than a hundred years, and it is safe to say that this rather nasty combination has brought the famous surgeon more glory and more notoriety than the prettiest operation that he ever invented. Alone or with other remedies, it is always to be recommended, and should be given either directly or in capsules. It is usually prescribed as follows:

R Balsam. copaib.,
 Spts. vini (80 per cent.),
 Syrup. Tolu., aa 60. (℥ii);
 Aquæ menth. pip., 120. (℥iv);
 Spirit. æth. nitrosi, 8. (ʒii).—M.

Sig.—A tablespoonful twice or three times a day.

When Chopart's mixture is not well borne by the stomach, as sometimes happens, the physician should, according to the circumstances and the necessities of the case, order large doses of cubebs or sandal wood oil. During the use of these remedies, the possibility of the occurrence of congestion of the kidneys must not be forgotten. Its earliest and surest sign is the so-called kidney pain, —an aching in the loins with a dragging feeling. The urine should be frequently examined, and at the first appearance of albumin, which indicates that the kidneys are being irritated more than is good for them, the employment of the balsams must be intermitted for a time.

The best means of dissuading a young man from contracting marriage during the existence of any urethral discharge is the representation to him of the peril it involves for himself, not only at the beginning of his married life, but also after. The risk of severe inflammation of the testicle as the result of any venereal excess during the existence of a discharge, however slight, must be made clear to him, and he must be warned also that phlegmonous urethral inflammation is not an unusual complication under such circumstances and that the symptoms produced by it are often very serious. On the other hand, the dangers to his wife must be insisted on and the fact that gonorrhœa in a woman is often incurable and is usually followed by absolute sterility. If circumstances are such that the marriage must be proceeded with, continence should be absolutely prescribed. It is a prescription difficult to get fulfilled, but I have known cases in which I felt sure that my advice in the

matter had had the proper effect and that the young woman had been saved from serious consequences.

GONORRHOEA AFTER MARRIAGE.

A married man who contracts gonorrhœa has usually only himself to blame. Not infrequently it will be found that his discharge is really a relapse of an old gonorrhœa, some focus of infection having remained in his posterior urethra or in some of the glands or the follicles of the urinary tract. From these latent foci of disease unusual hyperæmic conditions or a running down of the general health may have permitted and encouraged reinfection to take place. It is understood, of course, that I set aside for the moment all cases of chance infection. The physician understands how extraordinarily seldom gonorrhœa in adults is acquired innocently, though this may occur in hospitals, in barracks, and sometimes in camps, where a number of men are gathered together and even the ordinary precautions of cleanliness are not taken. In children it is not unusual for gonorrhœa to be the result of an accidental infection from a sponge or a towel, or from some article of clothing that has been worn by a gonorrhœa patient, or from a sheet, or even from unclean hands.

Sometimes married men deny all possibility of their having acquired the disease in the usual way. A patient who comes to us perfectly ready with a story like this changes his tactics, however, almost immediately when after full investigation, especially with the help of the microscope, we give him our frank opinion as to the cause of his condition. His memory is apt to be much improved! There is some circumstance or other that he had forgotten at the moment, or had considered of too little importance or of too slight significance to mention.

It is to be remembered in these cases that there is always question of the origin of the gonorrhœa, and that we should be very careful about making any rash statements concerning the possible source of the infectious material. Two things especially are to be borne in mind,—first, a man may, even after years of abeyance of the disease, reinfect himself; secondly, a man may infect his wife, and then, because the gonococci find in a new and virgin soil an excellent culture medium, they may take on a new virulence and produce in the husband very serious infection, though he is him-

self the author of the infectious material once removed. Originally in him it may have produced very few symptoms; it may even have escaped notice entirely. After passage through another organism, however, it may produce a set of very grave symptoms.

In cases where the fidelity of a wife is in question it is always necessary for the doctor to be extremely careful. The old maxim of Ricord should be remembered. No hint should ever be made of the infidelity of a wife, no matter how clearly circumstances may point to her guilt. As a rule, it is not difficult to so state the circumstances of the case as to remove the husband's suspicions, and the physician may feel that he is always doing his duty and acting for the best when he follows this policy. Occasionally, however, circumstances arise where the doctor requires all his tact and discretion. A man with whom he is unacquainted comes to his office, asks to be examined, and further requests that the examination shall be a microscopic one. The stranger then demands that a certificate stating the cause of his urethral discharge be given him. Evidently the physician has to deal with a patient who knows exactly what he wants. The practitioner may properly under these circumstances decline to give the certificate. To do so seems the wiser course, and it is the counsel, or at least the custom, of some of the best authorities in genito-urinary diseases.

Spontaneous exacerbation of latent gonorrhœa—or, to put it more forcibly, the awakening of a urethral catarrh which has slumbered for a considerable time—must not surprise the clinician. Almost ceaseless relapses and reinvasions occur during the course of the disease, and we must overcome them. Non-medical people are apt to think of them as new attacks of the gonorrhœa. An exacerbation of this kind may appear without any evident cause, seemingly as the result of the multiplication of the gonococci in a particular locality of the mucous membrane to such an extent that they force their way beyond the layers of protective inflammatory exudate which nature has thrown out against them. Relapse may follow the free employment of irritating nutritive materials,—of wine, especially champagne, of the stronger alcoholic liquors, and especially of beer, though this does not contain much alcohol. It may occur as the result of an erotic condition or of sexual excesses. In all of these cases the female may remain absolutely unaffected. The differential diagnosis of exacerbations of gonor-

rhœa in contradistinction to reinfection from without is made mainly by the careful investigation of the history of the case. The length of the incubation period is of most importance. If the first symptoms follow within a few hours after the suspected intercourse, the discharge is almost surely due to an exacerbation of a previously existent, but latent, gonorrhœa.

CHRONIC GONORRHŒA AND MARRIAGE.

Chronic gonorrhœa presents certain features, apart from acute or subacute gonorrhœa, that make it a fit subject for some special words as far as regards its relation to marriage. It is well to be careful of the use of the word "chronic" when talking to a patient with regard to his gonorrhœa. For the physician the word is apt to have no more meaning than "non-acute,"—that is, running a slow course; to patients it often seems to signify "incurable." It is the custom for physicians among themselves to talk lightly of "the morning drop." It is much better not to mention it to patients, since its enigmatic significance carries with it a train of suggestive allusions that may easily become illusions. For the cure of a gonorrhœa every favoring element is needed, and one of the most important of these is a feeling of encouragement and nervous restfulness on the part of the patient. A restless, dissatisfied state of mind is sure to lengthen the period of treatment. Hence the necessity for care in the designation of the form of disease from which the patient is suffering.

The physician must not be surprised at frequent relapses of urethral inflammation. They are always due to a remnant of active virus that somehow finds a lurking place and is ever ready to light up renewed inflammation at the earliest opportunity. The old aphorism, "It is easy to cure every attack of gonorrhœa except the first one," is, of course, an exaggeration, but contains a germ of truth that must not be lost sight of.

It is to these gonorrhœal relapses that most of the conjugal forms of disease are due. Unconscious infection by the husband is much more frequent than is usually thought. It must not be forgotten that in women the symptoms of gonorrhœa may be so slight as practically to escape notice. Most newly married women rather expect to suffer from a certain amount of inconvenience in urination and some genital irritation as the result of marital rela-

tions. A case of genuine gonorrhœa may run its course, especially in women who are not oversensitive, without producing any more symptoms than they anticipated in the ordinary course of initial marital life. Sometimes the existence of gonorrhœa becomes evident only from its complications; one of these that may easily be traced to other causes is gonorrhœal rheumatism. It must not be forgotten that, when young married people suffer from any form of acute, subacute, mono-articular or poly-articular arthritis, we must always think of gonorrhœal rheumatism.

Of good examples of this state of affairs I could furnish a number. One case I shall never forget. The patient was a young woman who on her return from her wedding-tour, passing through Paris, was compelled to take to bed because of severe pains in her hip-joint. No good reason for the occurrence of the arthritic condition could be found until Professor Lannelongue, suspecting that it might be of urethral origin, made an examination which confirmed his suspicion. The existence of gonorrhœa in the husband was afterwards demonstrated. In another case a young woman, a foreigner, while making her wedding-tour in France, was taken with extraordinarily severe inflammation of the left knee-joint. When I was first called to see her, she had a temperature of 41° C. Despite every precaution, the arthritis was followed by ankylosis, and the only relief we could afford was by having this occur with the limb in good position. In my first meeting with her husband I had the opportunity to obtain evidence of the presence of the gonococcus, which was found in a thin mucoid and apparently harmless secretion.

Many women suffer from leucorrhœa and internal pains shortly after their wedding-tour. They may afterwards abort or may remain sterile. The basis for all these symptoms is practically always gonorrhœa. Often does the physician hear the complaint, "As a young girl I was perfectly well, and it is only since I have been married that I have been ailing." In her pale, suffering face can be read the story of her illness, caused by marriage.

It is important, then, that we should allow no patient to marry in whom there is the slightest suspicion of the existence of gonorrhœa. In all doubtful cases the microscope should be used to determine the character of the secretion. A man who is suffering from a discharge that contains gonococci must be absolutely for-

bidden to marry until they have disappeared. Urethral discharges in which no gonococci can be discovered but in which leucocytes occur also require our prohibition of marriage until such discharges have ceased. A large amount of experience has shown that in these cases gonococci are present, though so few that they escape detection. After hyperæmic conditions of the urethra they are apt to multiply until the discharge becomes virulently infectious. If there is urethral discharge, be it ever so slight, without gonococci and composed only of mucus, the case is still suspicious. Not until we have investigated the case thoroughly by ordering various changes in the patient's diet, and by advising him to take rather liberally of alcoholic drinks, and especially of beer, on one or two occasions before our examination of his urethral discharge, can we be definitely assured that the secretion neither is nor is liable to become infectious.

ON THE DRAWBACKS TO THE SPINAL USE OF COCAINE AND THE ACCIDENTS DUE TO IT.

BY PAUL RECLUS, M.D.,

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SURGICAL analgesis produced by spinal injections of cocaine has by this time formed the subject for a large number of publications; for this reason, I think it may be well to take a general view of these documents, to see whether some useful conclusions cannot be derived from their inspection.

This method of anaesthesia was not invented in a single day, but passed through three successive stages. (1) In 1891, Quincke conceived the idea of making a puncture in the lumbar region in order to lessen the pressure on the nervous centres by allowing a little of the liquid to escape. (2) It was next proposed to inject in the same region medicinal substances for their direct effect on the spinal tissue, and Corning, of New York, followed by Sicard in France, had recourse to cocaine. (3) Finally, Bier, of Kiel, was the first to employ, in April, 1898, for surgical operations, the analgesis that cocaine causes in the lower part of the body when used in this way, and succeeded in performing six major operations on the bones of the lower limbs. It was, therefore, Bier who originated and carried out this method, which should justly be called by his name. He was soon followed by other operators, and in France by Tuffier, who up to the beginning of 1901 had made about three hundred lumbar injections, and had by his various publications brought the subject fully before the French medical world.

The technique of the lumbar injection is practically that recommended by Quincke, and we find only slight differences of detail in Tuffier's monograph and in Nacoviceano's excellent paper read at the last International Medical Congress.

The articles required are a syringe that can be thoroughly sterilized; a platinum needle pointed with iridium, with a short point, seven or eight centimetres long, and well obturated by a metallic

thread; a solution of cocaine, two per cent. according to Tuffier, but one per cent. in our opinion, since in that strength the alkaloid is sufficiently active and we had occasion to prove a long time ago that the toxic accidents with cocaine depend rather on the strength of the solution than on the amount injected. The dose for a grown person should be from one and one-half to two or even three centigrammes, though the latter figure should rarely be reached. Finally, the solution should be sterilized. Tuffier in a recent article says that the latter point had given him a good deal of trouble; but for several years now I have been able to get solutions of cocaine in sealed tubes that have been exposed to a temperature of 115° to 120° C. Over a thousand operations have shown me that the analgesic power of these solutions is not at all altered by heat.

Physicians are in the habit of putting their patients in what is called the gun-hammer position to make the puncture; but surgeons prefer to have them take the sitting posture and then bend forward as far as possible. In both of these attitudes the space between two vertebræ opens and facilitates the penetration of the needle. The point at which the needle is to be inserted must be determined, and this is the most delicate part of the operation. The lumbar region must first be scrubbed with soap and water; then a line should be drawn uniting the top of the two iliac bones and passing over the spiny apophysis of the fourth lumbar vertebra. The needle should be inserted immediately above, either directly between the two vertebræ or one centimetre to the right or the left of the apophysis, and then directed a little upward and outward. The point goes through the skin and the muscular masses, but sometimes strikes the bony tissue, when it should be partly withdrawn and directed either higher or lower. The most skilful operators have had to repeat the attempt two, three, and even five or six times before finding the elastic sheath, which when perforated admits the needle into a sort of cavity; the metallic thread is then withdrawn from the needle, and the liquid flows out in drops in more or less rapid succession.

But in some cases no liquid passes through the needle; it is then desirable to avoid making the mistake that I have twice made and that others have made as well, though the fact has not been published. No liquid comes out through the needle, and the question naturally is whether the subarachnoid space has really been

punctured; the needle is then pushed farther in and reaches the anterior wall, into which it penetrates, wounding perhaps one of the veins of the rich plexus there located. This is wrong; the needle should be withdrawn and the puncture repeated.

When transparent drops show that the space has really been reached, the syringe, charged with one or two cubic centimetres, according to whether a two or a one per cent. solution is used, should be adjusted and the piston slowly pushed until the injection has been completed; the needle must then be withdrawn and the puncture of the skin obturated with a little collodion.

The usual result, says Tuffier, of this subarachnoid injection is an analgesic condition of the lower limbs and of the subumbilical and subdiaphragmatic regions. This is sometimes, though not often, true, if I may rely on my own cases and on those of the greater number of operators. Analgesis begins sometimes by the feet, sometimes by the external genital organs, and sometimes by both, in a length of time which varies from five to ten minutes, and is sufficiently complete to permit the most delicate and the most extensive operations to be performed on the lower half of the body; healthy or inflamed tissues, skin, aponeuroses, muscles, bones, and even nerves may be cut, twisted, burned, or lacerated without the patients feeling the slightest pain or complaining of anything more than mere sensation of contact. In the successful cases analgesis by spinal injection of cocaine is absolutely perfect, the patient being as quiet and passive in our hands as in the best cases of chloroform or other narcosis; and, since this analgesis may last from an hour to an hour and a half, it enables us to undertake the longest and most difficult operations.

We must now endeavor to estimate the price at which these unexceptional cases are obtained, and the list of the accidents that accompany or follow lumbar injections of cocaine is a long one.

It should be noted, to begin with, that analgesis may fail altogether or be inadequate, for two reasons: (1) Oftener than has been admitted the operator fails to make the injection: the needle either does not reach the cavity at all or passes entirely through it; no liquid comes through the needle, or nothing but blood; in a word, the attempt fails, and the operator resorts to chloroform or ether. I must admit that on two occasions in the early days of the method this happened to me. (2) In spite of a successful injection,

analgesis may either fail altogether or be incomplete and of too short duration to enable the operation to be carried through. As a general thing, this is supposed to occur in only two or three cases out of a hundred, but my experience would indicate that this percentage is too low. In one case analgesis took an hour and a half to occur, by which time the patient had already been carried back to bed and the surgeon had left the hospital.

Finally, cases have been published in which analgesis disappeared gradually in eleven, twenty-five, twenty-nine, and thirty minutes, a length of time too short for the operation to be completed. Quite recently in a radical cure of hernia I found that eleven minutes after the beginning of the operation the skin of the region had already regained sensation.

Though the drawbacks so far mentioned are quite unusual, such is not the case as regards the appearance of some of the disagreeable symptoms which accompany or follow the spinal injection and which may be said to be almost the rule. I will merely mention the tingling, heaviness, and sensation of going to sleep felt in the limbs, as well as the trembling which sometimes interferes with the operator and obliges him to pause in what he is doing. Nausea or vomiting is more distressing, not only on account of its frequency, which is from thirty to fifty per cent., but also because in certain operations on the abdomen, such as laparotomy, making an artificial anus, or radical cure of hernia, it forces the intestines through the opening. It is said that this is only a temporary symptom, but the fact is that nausea may last from two to even six days, as was the case with one of my own patients. Paralysis of the sphincter ani, mentioned in all the publications on the subject, shows itself by emissions of flatus and fecal matter, which sometimes soils the operative field, and this disagreeable condition lasted for seven days in one of my cases. Paraplegia is not unusual; one of my patients, on whom dilatation had been performed for fissure, left the hospital cured on the third day, but returned to a medical ward on the same evening on account of impotence of the lower limbs. Cephalalgia is the commonest symptom, occurring in about fifty per cent. of all cases; it is often unbearable, and, although it usually disappears on the second day, it may last for three or four days. Finally, the temperature may rise after the operation to 103° or 104° F., although it goes down to the normal again in twenty-four hours.

Still, among all the drawbacks that I have so far mentioned there is no very serious one, and except for the headache, which is sometimes really violent, they might all be overlooked if the lumbar injection did not endanger the patient's life. This is naturally the point of the whole question, and if Bier's method is, for certain operations, to take the place of the other anæsthetics, such as ether, chloroform, or the local use of cocaine, its advocates must first show that it is less dangerous than these substances, or in any case that its death-rate is not higher.

This point has been far from demonstrated, and surgical analgesis by spinal injection of cocaine has already a heavy death-rate. I will only mention the cases of serious syncope which add years to a surgeon's age, where the means employed for snatching a patient from the condition of apparent death finally restore him to life. Medical literature mentions a great many of these cases, but for my present purpose I wish to speak only of the cases of actual death from the method, where the occurrence cannot be disputed. The following are those which have been found in an inquiry that has not exhausted the question; there are no doubt others which have not come to my notice, besides those which for various evident reasons have not yet been published.

Professor Julliard, who after four not very encouraging cases definitely abandoned the method, reports the following case. wishing to operate on a man forty-five years of age for hydrocele and inguinal hernia, he made a spinal injection of one and a half centigrammes of cocaine; in ten minutes analgesis was complete and the operation was performed. Two hours later there were violent headache, stiffness of the neck, and generalized trembling; the temperature was 39° C., pulse 116; the patient then entered into a comatose condition, and died on the second day. At the post-mortem a ruptured aneurism of the Sylvian artery was found. This is very well; but it may be asked whether the encystic vasoconstriction caused by the cocaine was not largely accountable for the premature rupture of the aneurism.

In Tuffier's case a man of fifty-two was operated on for eventration under analgesis by Bier's method. Two hours afterwards he became asphyxic, and died in spite of artificial respiration and tracheotomy. At the post-mortem mitral lesions and acute œdema of the lungs were found. This is very well also; but here again,

and more so than in the preceding case, the question arises whether the injection of cocaine did not have something to do with the rapid cedema and death.

The two cases just quoted are evidently not conclusive, but in the following ones it would be difficult to have any doubt as to the blame to be attached to the spinal injection.

To a man thirty years of age Heumberg gave a spinal injection of cocaine; symptoms of coma soon set in, and the patient died in fifteen days, the post-mortem showing hemorrhage of the lower extremity of the spinal cord.

In a fourth case, published by Dumont, a tubercular patient, eighteen years of age, with fever and bad general condition, received in the lumbar region an injection of one and one-half centigrammes of cocaine. Two hours later the temperature rose to 104° F., but soon fell to far below the normal. At the end of the second day death occurred; the post-mortem could find nothing to account for fatal termination except the action of the alkaloid.

Goilav publishes a fifth case. Having to amputate a patient's leg, he made a spinal injection of one and one-half centigrammes of cocaine. Two hours after the operation the temperature rose to 100° F., then to 104°, and the pulse to 125. Twenty hours afterwards the patient was dead.

Jonnesco has also reported a case of death under similar circumstances, which brings the number of fatal cases up to six.

The American medical press speaks in several places of a seventh case due to cocaine, in which there was no doubt that the cocaine was to be blamed; but I have not been able to find the report of this case, and this is also true of one or two others to which certain American papers refer.

It therefore appears that there are six, and maybe seven or eight, cases of death in a total of less than two thousand spinal injections of cocaine. This is an enormous proportion, enormous both in an absolute and in a relative way. Our authorities give one death in two thousand three hundred cases for chloroform, one in seven thousand for ether, and *none* in seven thousand for the local use of cocaine, according to my personal statistics, which has now reached this large figure. For this reason I am surprised to find no mention of these catastrophes in Tuffier's monograph, although it is a recent publication, having appeared at the end of January, 1901.

Tuffier appears to think that the lumbar injection is free from all harm.

In the presence of such a state of optimism it is necessary to sound a note of warning. Although I quite agree that the method should be further tested, I think, with Bier, the inventor of the method, that at the present time, and with a technique still uncertain, the lumbar injection gives a less degree of security than our ordinary anæsthetics; so that, until further proof is furnished, ether, chloroform, and the local use of cocaine cannot, without injustice and danger, be dethroned, even partially, from their present eminence.

THE SELECTION OF FAVORABLE CASES OF PULMONARY TUBERCULOSIS FOR SANATORIUM TREATMENT.

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THE continual increase in the number of sanatoriums for working people, projected or already in operation, brings this subject to attention more and more; and until reception hospitals are provided for acute and doubtful cases only the most favorable ones can be treated. It is an economic question of great importance, especially with State and municipal institutions; doubtless for many years to come the number of applicants will far exceed the accommodations and necessitate close discrimination in selecting patients for treatment.

In no disease is an accurate prognosis more difficult, and only the broadest distinctions can be made. Many so-called "incipient" cases are decidedly unfavorable, while not a few "advanced" ones are favorable for indefinite arrest, even if not for actual recovery. It is frequently impossible without a trial to say whether such cases are favorable or not, yet, so long as no provision is made for acute cases in or near sanatoriums, they will doubtless have to be excluded in the interests of those less ill who would be depressed by their presence.

Except during hot weather, patients with very acute symptoms, such as chills, high fever, and sweats, are far better kept at home, if properly nursed, until such time as there may be some reasonable prospect of admission to a sanatorium.

Other considerations than the condition of the patient too often weigh in urging them to apply when too ill for admission or when too late for recovery, but some general directions may prevent the extravagant promises occasionally made to them. The stamp of incurability goes with a refusal, which works much cruelty to those who without sufficient thought are by their physicians or friends

induced to apply. This might frequently be avoided by a more careful consideration of those factors which constitute a favorable prognosis and the opposite.

It is easy to define a favorable case, but manifestly difficult to be concise, and the following attempt should not be understood as aiming to be wholly comprehensive nor free from error in application to certain exceptional cases. It is prepared in a condensed form to facilitate a grasp of salient points, only those factors being named under "doubtful" or "unfavorable" which are considered such, although it may happen that but one of them is present and all other indications are "favorable."

It must be admitted that in the light of our present knowledge most of the early cases cannot be considered incipient when they first consult a physician. The growing appreciation of this fact should lead to the instruction of young persons in the schools of higher grade as to the earliest symptoms, while periodical inspection of employees in the large industries would yield good results in detecting the disease in a curable stage. Especially important is the judicious following of cases of slight blood-spitting and of families in which the disease has already occurred.

Favorable.—Age: between fifteen and fifty (except at menopause). Occupation: open air, or not too arduous indoor. Parental history: parents fairly vigorous, though not necessarily free from tuberculosis. Personal history: previous good health, or only illnesses followed by complete recovery; good nutrition and digestive functions. Beginning of tuberculosis: not noticeable, or from a "cold," "grippe," bronchitis, mild "malaria," or debility. Habits and intelligence: good, or free from excesses. Symptoms: Of short duration, or long intervals without any extending over longer period; occasional short periods of irregular fever and sweats; temperature average not over 100° F.; slight hæmoptysis; moderate debility, anæmia, loss of weight and appetite; shortness of breath only on much exertion; menstruation ceased only few months. Present condition: fair physique, intellect, and *morale*; deep chest, expansion one or more inches; normal or only temporarily rapid pulse; good peripheral circulation. Complications: none, unless there be superficial ulceration of vocal cords without infiltration; mild dyspepsia; slight enlargement of cervical lymph nodes; arrested bone or joint tuberculosis. Lesion in one apex:

cases with slight dulness; prolonged expiration; few râles distinctly localized; slight cough, with or without expectoration; cases with some excavation, but entirely or practically arrested, and slight expectoration and fever; early signs to fourth rib, fair history, no complications. Lesions in both apices: cases with early signs, well localized; good history, color, physique, and nutrition. Lesion in lower lobe or entire side: dry pleurisy only, or with effusion and short period of fever; thickened pleura; mild symptoms.

Doubtful.—Age: under fifteen and over fifty. Occupation: confined and dusty,—lead-workers, miners, quarrymen, grinders, polishers, tailors, actors, bar-tenders, seamstresses, etc. Parents: delicate; mother tuberculous. Personal history: delicate constitution; neurotic temperament; frequent illnesses. Beginning of tuberculosis: “chronic bronchitis;” “pneumonia;” “typhoid fever;” prolonged dyspepsia or occasional diarrhœa, with fever; “bronchitis” following measles; anæmia; prolonged “chills and fever.” Habits and intelligence: dissipated; careless or ignorant; wilful. Symptoms: prolonged debility and fever several months; hoarseness; severe cough or hack six months or more; repeated hæmoptysis of considerable amount, or with occasional chills, fever, and sweats; persistently high pulse; marked anæmia; slight cyanosis and hectic flush; dyspepsia. Present condition: delicate or slender build; depressed clavicular spaces; deformed or flat chest; neurasthenic or excitable. Complications: ulcerated vocal cords and interarytenoid space, without infiltration; peritoneal, bone, or joint tuberculosis; enlarged cervical lymph nodes; tuberculous otitis media; slight albuminuria, irrespective of fever; old syphilis; chronic cystitis; mitral heart disease. Lesion in one apex: cases with early signs, febrile, poor physique, etc.; dulness; coarse or bubbling râles; acute symptoms; cavity, with debility, chills, fever, and sweats. Lesions in both apices: early signs; symptoms more marked; flat chest or poor physique, etc. Lesion in lower lobe or entire side: slight dulness; harsh breathing; few râles, indicative of slight infiltration; pleurisy with effusion and long-continued fever; entire side,—scattered signs, good history and condition, mild symptoms.

Unfavorable.—Age: under ten and over sixty. Both parents delicate and tuberculous; maternal tuberculosis at birth. Personal history: frail constitution and late maturity; rhachitis or severe

illnesses in childhood; always below normal weight for height. Beginning of tuberculosis: "typhoid" or "typho-malaria" fever, from which complete recovery did not ensue; "unresolved" lobar pneumonia or bronchopneumonia; chronic dyspepsia; prolonged diarrhoea with frequent looseness; disease developed during menopause or pregnancy or immediately after delivery. Habits and intelligence: depraved; alcoholic excess; reckless and despondent. Symptoms: marked debility and long period of fever, with or without chills and sweats; rapid pulse (distinguish purely nervous cases); well-marked dyspnoea; abdominal breathing due to lack of chest movement; swollen feet; complications. Present condition: very frail build, or tall and slender; pigeon-chested or markedly rachitic; kyphotic spine; curvature of nails; marked cachexia or chlorosis; markedly neurotic, despondent, or melancholic; actual melancholia or insanity. Complications: intestinal, genito-urinary; tuberculous bones; deep-seated laryngeal tuberculosis; infiltrated arytenoids or epiglottis; generalized lymphatic tuberculosis; fistula in ano, with rectal ulcer; diabetes; nephritis; recent syphilis; chronic gastritis or enterocolitis; valvular heart disease, not compensated; emphysema; empyema; pneumothorax or hydropneumothorax. Lesion in one apex: large cavern; acute pneumonic progressive; one entire side extensively infiltrated. Lesions in both apices: cases with dulness, coarse or bubbling râles, or cavities, with constitutional impairment, or marked mixed infection as evinced by chills, fever, and sweats. Lesion in lower lobe or entire side: extensive infiltration (distinguish thickened pleura, not necessarily unfavorable); pneumonic consolidation, or excavated middle or lower lobe; bronchopneumonic lesions on one or both sides; chronic fibroid phthisis; miliary generalized disease, as indicated by vague (not localized) physical signs; rapid pulse and respiration, cyanosis.

REMARKS ON THE TREATMENT OF BLEEDERS.

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HÆMOPHILIA, or the hemorrhagic diathesis, is a condition of interest to all surgeons, and must be so until we possess a better knowledge of its cause and greater confidence in the treatment which we may elect to try in any case which may demand our help. We are still unable to say with a feeling of conviction that a particular remedy is of universal application and that it can be successfully used in every case. There are several theories as to the nature of the diathesis, but no agreement that in any manner helps those in charge. In the absence, then, of definite knowledge why the subjects of this condition suffer dangerous and excessive loss of blood after injury, and even at times without injury, we must to some extent make experiments. One is confronted by a long list of internal remedies that have been tried with varying success, whilst the variety of methods that have been employed to arrest the bleeding from a wound is almost beyond belief. Each surgeon has, moreover, his own idea, and there is little to be gleaned from the records of the past. What has failed with one has succeeded with another, and *vice versa*. Some of the more recent suggestions are hopeful, but their usefulness is not yet proved. When a patient is bleeding to death from a wound, it is not possible to limit treatment to internal remedies alone; an attempt must also be made to arrest the hemorrhage by local applications. We obtain, therefore, the result of the use of more than one remedy and cannot always decide to which credit is due when the outcome is successful.

In the first of the two cases which I wish to bring forward, the patient recovered after the internal administration of calcium chloride and the external application of suprarenal extract. In the second the hemorrhage was into the subcutaneous tissue and among the muscles of the limb.

CASE I.—Boy, aged thirteen, at school, was admitted to St. Thomas's Hospital October 25 and discharged December 27, 1900.

Family History.—Mother, aged forty-two, married twice; no history of bleeding in either husband. Has had six children and two miscarriages; has always bled freely after labor and once had severe flooding; had severe flooding after both miscarriages. Catamenia always very profuse.

Family.—By first husband: (1) Male; died at age of four, after measles; had several attacks of bleeding, once after a cut on the lip. (2) Male; now in South Africa; not a bleeder. (3) Female; not a bleeder.

By second husband: (1) Male; the patient. (2) Female; delicate, but no attacks of bleeding. (3) Male, aged nine and a half years; has had several bad attacks of bleeding, and was once in Charing Cross Hospital for three months for bleeding.

Previous History.—He was always considered delicate, and has been liable to severe bleeding from the nose.

Present Illness.—Five days ago he was getting over some spiked rails, when he slipped and ran a spike into the inner side of the right thigh. He was taken to a doctor, who bandaged the wound. After three days the doctor dressed it, and a good deal of bleeding occurred. Two days later the doctor again dressed it, and, as bleeding was still going on, he advised removal to the hospital.

On Admission.—The patient was a bright, intelligent boy, with dark hair and eyes, well developed, and of active temperament. There was a gaping lacerated wound on the inner side of the right thigh, filled with blood-clot, which had an offensive odor; there were also swelling and discoloration of the thigh up to Poupart's ligament, with tenderness on pressure.

October 28. There was a very severe attack of bleeding last night. He is taking calcium chloride, fifteen grains, every four hours. Wound very offensive. Bleeding stopped. Firm bandaging.

October 29. Restless and anæmic; temperature 101.4° F.; pulse 120; respirations 24.

October 30. Temperature 102.8° F.; pulse 142; respirations 28. Drowsy; no more bleeding.

October 31. Temperature 103.2° F.; pulse 140; respirations 28. Another attack of bleeding from the wound, but not so severe

as the last; the application of a tight bandage arrested it. Slightly delirious and very restless. Taking calcium chloride, twenty-five grains, every four hours.

November 1. There was a third attack of bleeding last night, and a fourth this morning, which was very severe. Some blood was collected in a sterilized test-tube and set aside for coagulation; this seemed thinner and paler than normal. The wound was freed from clot and explored; no definite bleeding point being found, it was plugged with a strip of gauze soaked with a five per cent. solution of suprarenal extract. No more bleeding after plugging; temperature 103° F.; pulse 126; respirations 28.

November 2. The plug was changed. The wound, which looked pale and sloughy, was syringed with normal saline solution. Thigh rather more swollen and very tender. The discoloration has gone. Temperature 100.2° F.; pulse 132; respirations 28.

November 3. No more bleeding; dressing of wound not changed; patient slightly delirious. Temperature has varied from 100.6° to 101.4° F. in the last twenty-four hours. P.M. Wound dressed. A crop of small blisters has appeared in the fold of the groin and there is rather more swelling of the thigh. Child has a better color,—less pale.

November 4. Suprarenal extract discontinued; wound plugged lightly with dry gauze. No more bleeding. Temperature last night was 103° F.; pulse 132.

November 5. No more bleeding. Temperature 98.8° F. An abscess has appeared in the groin.

November 6. Abscess has broken; wound in thigh looking much better. Temperature normal; pulse 104; respirations 28.

November 7. Dressed. A small fluctuating swelling noticed just above groin. Temperature 102.8° F.; pulse 124; respirations 30.

November 8. Abscess discharged. Temperature 99.4° F.

November 9. Wounds looking well and not offensive. Temperature 99° F.

November 20. Wound in groin almost healed; wound in thigh granulating well. Temperature normal.

December 4. Both wounds almost completely healed. Syringing and plugging discontinued; wound dressed with iodoform. Temperature normal; pulse 88; respirations 16.

December 18. Large wound completely healed; that in groin almost healed.

December 27. Discharged cured.

Oxygen was inhaled daily for about ten days, during convalescence, without producing any change.

He was seen after his return from a convalescent home, and had recovered his general health.

The real usefulness of the remedies employed in the treatment of this case is open to question. Of the three principal ones—calcium chloride, suprarenal extract, and oxygen—much can be said against the idea that they are to be credited with the result. To begin with, calcium chloride has good claims to be regarded as a remedy which has the power of increasing the coagulability of the blood, but even Major Wright¹ does not consider it efficient after two or three days' employment. As to the suprarenal preparation, it is expressly stated that it is not thought likely to prove useful in hæmophilia. Possibly the packing of the wound was the important point in this treatment. The oxygen, which was recommended by W. H. Brown² as a useful agent in these cases, appeared to produce absolutely no difference, and I can but think that the improvement recorded by him was a coincidence only.

CASE II.—One of the most interesting cases of the hemorrhagic diathesis that I have been called upon to treat was that of a boy aged twelve.

In his family it was stated that his mother always bruised readily, and so did her grandmother on the father's side. Beyond this there was no evidence of disease in any other member of the family, some eight in number, until the arrival of a baby about a year after I first saw the patient, and this baby was found to bruise very readily, especially about the legs. An uncle was said to carry a blood-stone about with him as a preventive against bleeding. The patient was a thin boy with sallow complexion, light-brown hair, light-blue eyes, and badly developed muscular system. In him the history of the disease was well marked. When a baby he was so constantly marked with bruises that the nurse in charge was sent away, it being thought that she ill-treated the boy. He could not

¹ British Medical Journal, 1893, vol. ii. p. 850.

² Lancet, 1898, vol. ii., December 6.

take the bottle, because his lips became ecchymosed after sucking at it. At the age of three months he ran a piece of stick from his mouth into the left cheek; this was followed by most extensive swelling of the cheek, and the medical men consulted, both in town and country, thought he was suffering from "cancer," but, as discoloration of the surface appeared, his mother took a more hopeful view. When a year or two old he fell upon the back of his head. The nurse had let him fall on a marble fender, and he had a fit at once. The mother, fearing that he would bite his tongue, protected it and replaced it in his mouth. His head became enormously swollen; he was constantly calling out during the time, but no other symptoms ensued and the swelling disappeared.

A year before he came under my care, during the month of August, he jumped from the top of a wall six feet high. Two days afterwards a painful swelling appeared over the inner malleolus of the right leg; this broke spontaneously and disappeared in a few days; but before it healed another swelling appeared on the same leg higher up and followed a similar course. Later abscesses appeared over the right hip, left leg, left hip, and left arm above the elbow. In each place thick pus was discharged, and not blood. No rigor marked the progress of the disease, but the pulse was rapid and the temperature high, 107° F. being recorded on more than one occasion. The illness lasted from three to four months. It seems probable that the attack was one of pyæmia, but it is interesting to note the absence of bleeding when the abscesses spontaneously emptied themselves. He was said to suffer from "rheumatism" during the summer, as a rule.

In consequence of his having developed contraction of the right knee, it was deemed advisable to have an opinion as to the best way of straightening this, and under the supervision of an eminent surgeon forcible rectification under ether was carried out. The limb was afterwards bandaged in a MacIntyre splint. I saw him for the first time on June 13, two days after this forcible rectification. He had passed a bad night, having been very restless and calling out about the pain, located principally in the calf of the leg, which was markedly swollen, with a shiny skin and great tenderness and hyperæsthesia. He was unable to move the leg, and all restraint, such as splint or bandage, was taken away. The pulse was 132; he was feverish (temperature over 103° F. in the

evenings), and required morphine to obtain any rest. My attention was drawn to the condition of his hair, which along the centre of the scalp, for a short and equal distance to either side of the middle line, was rough and upstanding, and no amount of brushing could make it lie down. There was no undue sensibility of scalp. I have mentioned this especially because his mother regarded it as a sign of the progress of the case. When the hair resumed its natural position and no longer stood stiffly erect, she knew that he was on the road to recovery.

June 14. The skin of the leg had become red and shiny, looking tense and as if distended to the utmost. Measurement showed it to be three inches more in circumference than its fellow. The leg was hard and the calf moved as a whole on lateral pressure. Edema of the lower third of the leg and of the foot was present. The leg had become again drawn up, the heel almost touching the tuberosity of the ischium. A purplish-green appearance of the skin was visible along the posterior margin of the tibia. This appearance of bruising in the skin was hailed with satisfaction by his mother, who said that he usually began to get better soon after this appeared. The swellings generally lasted three or four days at their height, and then subsided.

June 15. On the third visit there was more swelling, and he had had a restless night. The bowels had acted and the fæces were black; it was stated that the stools always became black when the bruise appeared in the skin. His mother expected this; "yesterday the bruise appeared, so to-day the motion would be black." The skin was cooler and the bruise spreading. The evacuations resembled those of a patient who was taking iron medicine, which the patient was not doing.

June 16. He passed another restless night, being awakened by pain at short intervals. Temperature this morning 98.6° F. The leg has a red, shiny, smooth appearance, and is nearly four inches more in circumference than the other. This swelling is very hard, and there is more œdema of the foot and ankle.

On the 22d the swelling was smaller; he had no pain; slept well. The fæces were loose and dark at first. He eats ravenously; this morning he had three breakfasts including a chop and a steak.

Some months later I saw him again. He had then had other blood swellings; these were in the thigh; those in the posterior

part of the thigh resulted from his having been taken out in a basket perambulator without sufficient padding of the edge of the seat.

He walked into the room on tiptoe, with bent knees and hips, and used his hands to help in progression, something as a monkey does. The knees were somewhat better as regards the angle of flexion, but it was not possible to extend them beyond a right angle. The use of a tricycle effected wonders; one was made to fit the patient, with a movable seat and pneumatic saddle. On this he was able to get out of doors, and the legs gradually resumed their normal condition, with increase of muscular development. I have since lost sight of the family.

In this case an application of lead lotion with the extract of belladonna was made to the blood swellings, and instantly caused relief of the pain and hypersensitive condition of the skin. His mother thought that it shortened the duration of the illness, and successfully used it on subsequent occasions of similar trouble.

The close resemblance of some of these swellings, containing only blood, to acute abscesses must be remembered and the surgeon be on his guard. The acute pain, rapid swelling, excessive tenderness, local heat, and high temperature, with fluctuation, render a diagnosis difficult, especially when the tension is so great that the skin becomes thin, red, and shiny. Only the history of the case is of any use, and it may not be procurable. I recollect a case in which the opening of a small swelling, which resembled an abscess, over the front of the patella, by a surgeon who was unaware of the child's history, started an illness of several months' duration, during which hemorrhages were frequent and exhausting, and a fatal result was with difficulty averted. Of course it is possible that a patient, knowing the extreme danger attending any operation on a bleeder, may yet wish to run the risk, and may conceal from the surgeon the knowledge that he is a bleeder. This happened in the case of a man under the care of a former surgeon to St. Thomas's Hospital, Mr. F. Mason. The man, aged thirty-two, wanted an operation for fistula, and died of hemorrhage from the incision made, in spite of all care. He confessed that he had purposely suppressed the information that he was a bleeder. The resemblance of some of the chronic joint affections following hemorrhage to the results of tubercle must be remembered if operative measures are being considered. In the case of accidental injuries which must

prove fatal if no operation is done, it is probably right to give the patient the chance afforded, but there must be no doubt in the mind of the surgeon that nothing else will be of use.

In the case of wounds no departure must be made from the rule as to proper cleansing of the part, and no effort should be spared to make clean a dirty septic wound. In the first of these cases there was a septic punctured wound, and some accumulation of pus took place in the upper part; this suppuration accounted for the temperatures; but it is not uncommon to meet with a somewhat similar condition of temperature with fever in cases of hemorrhage in which the wound presents no obvious changes of septic nature.

When the wound has been cleansed, light but firm plugging with gauze, even bandaging, and raising of the limb should be tried. I am quite certain that the application of such things as perchloride of iron or the actual cautery is bad, for sloughing wounds are caused, followed by surrounding inflammation, and any relief is only temporary, as hemorrhage recommences on separation of the sloughs. It must be remembered that, although a wound in a subject of this kind does not often present any definite vessel that can be caught, a careful search should be made for such a one, otherwise a wounded artery of some importance may be overlooked. The disease is essentially congenital, and this fact must not be forgotten in deciding whether a patient is a bleeder or not. I have more than once seen a case of hemorrhage accounted for on this plea, unsupported by convincing evidence. I fear a septic wound had more to do with the hemorrhage than the constitution of the patient.

I have come to the conclusion that belladonna is very useful as a local application in the subcutaneous effusions of hæmophilia, but, although it has seemed to give a good result when administered internally in spontaneous hemorrhages from the mucous membranes, I have not had the chance of fully testing it.

Among more recent remedies is gelatin. Heymann¹ has used subcutaneously one hundred and forty cubic centimetres of a 2.5 per cent. neutral solution of gelatin in salt solution, and repeated it, but his case is not convincing, nor is that of Nicholls,² who arrested the bleeding by pouring gelatin into a wound of the wrist.

¹ Münchner medicinische Wochenschrift, August, 1899.

² Medical News, December 2, 1899.

Medicine

CONVULSIONS IN INFANTS AND CHILDREN UNDER THREE YEARS OF AGE.

BY JOHN ABERCROMBIE, M.D. (Cantab.), F.R.C.P. (Lond.),
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Varieties.—You will find that the public make a distinction between *convulsions* and *fits*, which we are quite unable to appreciate,—the terms are synonymous. The attacks may be epileptiform,—that is, commencing with a stage of tonic spasm, followed by clonic spasms, and terminating in a state of sleep or coma; or the form known as *petit mal*, by which we understand momentary loss of consciousness without necessarily any perceptible muscular spasm or convulsion. “Inward fits,” a favorite popular term, are perhaps the forerunners of genuine convulsions, betrayed by slight twitching about the mouth, starting in sleep, eyes half-open during sleep, and thumbs sometimes turned into the palms; if there should also be a livid hue around the mouth, you may be sure that a fit has really occurred. Among other varieties may be mentioned carpopedal contractions, tetany, and laryngismus stridulus.

The *exciting causes* of convulsions are numerous and varied: disturbances of the alimentary canal come first in importance; too much food, unsuitable food, diarrhœa, constipation, teething, worms; renal irritation,—*e.g.*, from calculus; brain disease, including tubercular meningitis; hydrocephalus, congenital syphilis, injuries to head, burns, fright, congenital malformation of the heart, the onset of acute lung disease, or one of the eruptive fevers or whooping-cough. Convulsions then are generally reflex. At birth only parts of the nervous system are structurally complete: extensive tracts of fibres have not yet acquired their white medullary substance, and until the axis-cylinders are thus clothed the fibres have but little conducting power. The lower centres are

farther advanced than the higher, and are therefore imperfectly controlled. This is probably the chief reason why reflex disturbances are so common in infants. Neurotic inheritance may be found in a large proportion of cases, especially when the convulsions are repeated; when any family predisposition exists, a most trifling cause may suffice. Convulsions generally arise from eccentric causes, not from primary disease of the brain, or at least they do not occur as a symptom of brain disease until an advanced stage has been reached.

There is no essential difference between convulsions and epilepsy so far as the fit is concerned; the difference lies in the temporary character of the one and the chronicity or liability to recur of the other. It has been suggested to class all fits in children over two years of age as epilepsy and in those under two years as convulsions; but in many epileptics the fits date from early infancy, even from so early an age as fourteen days.

In the reflex convulsions of children the most important factor is rhachitis, signs of which are present in the large majority of such cases. In rickets, owing to impaired nutrition, there is excessive activity of the nerve-centres, or, it may be said, there is an excitable condition of brain, causing it to discharge itself spontaneously on what would otherwise be an inadequate stimulus. The exciting causes, as we have seen, are mostly reflex; the irritative condition of the digestive tract is most important; diarrhœa, constipation, or offensive passages being the commonest causes. It is doubtful whether teething would cause convulsions apart from rickets. Other sources of alimentary-canal disturbance would be the ingestion of food in too great quantity, or indigestible food, or the presence of foreign bodies in the alimentary canal. Round worms certainly may be the cause of fits; tape-worms very rarely are; and it is doubtful whether thread-worms ever are. Any source of peripheral irritation may cause them,—for example, a burn, a scald, a fall or blow on the head, otitis, or the presence of a foreign body or even wax in the ear. Convulsions may occur from exhaustion, as from severe diarrhœa, when they are due partly to acute impairment of nutrition of nerve-elements and perhaps also partly to deficient blood-pressure. Great exhaustion from any cause, as well as hereditary tendencies, may predispose to convulsions during the whole period of childhood. Fatal attacks are frequently asso-

ciated with a hyperæmic state of the cerebral blood-vessels, probably as a result rather than the cause. It is probable that long-continued convulsions may give rise to hemorrhage into the brain or its membranes.

The convulsions of rickets may be few and cease after a few days, or they may recur during several weeks or months; if they continue after the cause has ceased, the condition is indistinguishable from epilepsy. Convulsions at first purely reflex may, especially when there is a neurotic inheritance, pass into true epilepsy. Each additional fit leaves the brain more prone to another; and it may well be that convulsions, due to some trifling local cause, may become in some cases a confirmed habit (*i.e.*, epilepsy). Convulsions, if repeated at short intervals and for a long period of time, may lead to imbecility.

Diagnosis.—Always take the temperature in the rectum; the onset of one of the exanthemata or of any acute disease may thus be excluded. If the temperature be found to be raised, it would be impossible to say what the case might be, though the existence of any infectious disease in the house would, of course, be highly suggestive. Look for signs of rickets in the shape and size of the head and the state of the anterior fontanelle, the beading of the ribs, contraction of the chest, enlargement of the ends of the long bones, and a general laxity of the ligaments. If there is no evidence of rickets or gastro-intestinal or other source of irritation or exhaustion, the possibility of organic disease has to be borne in mind. Convulsions are not uncommon in congenital malformation of the heart without any special obvious cause.

Prognosis.—There is greater danger of the child dying during the fit when this is due to rickets than when it is due to epilepsy, and the younger the child the greater the danger. Convulsions occurring in the course of measles, scarlet fever, or whooping-cough are always significant of danger. Whatever the cause, stertorous breathing, great lividity of the face, blueness of the nails, high temperature (105° F.), or a very rapid pulse are of serious import; and the prospect is more unfavorable in proportion to the rapid succession and severity of the convulsions. Convulsions occurring in the course of organic brain disease are always unfavorable; in rickets, where there is a distinct neurotic predisposition, convulsions may lead to imbecility. Sometimes in a case of acute

illness the child may die before sufficient time has elapsed to permit of a diagnosis being made.

Treatment.—Remove the cause where possible; give emetics or purgatives if indicated; do not forget to examine the gums, and look to the ears. If there is high temperature, give a cold bath; if the child is collapsed, give a warm bath, with cold water to the head, but, unless it has an immediate beneficial effect, do not repeat it. An enema of bromide of potassium and hydrate of chloral, four grains of each, may be prescribed for a child six months old. When you want to stop a convulsion, if it has lasted more than five minutes, you may administer chloroform; cyanosis would not be a contraindication for its use, but do not employ it if the child is already collapsed, has a very small and rapid pulse, and the extremities are becoming cold. Always treat the rickets if present. In epilepsy the persistent use of bromides will generally effect some improvement. The old-fashioned plan of putting in a seton is well worthy of employment in obstinate cases; the seton must be kept in for some months.

Aphorisms.—I will conclude my article with a few aphorisms, which I trust you may find useful in practice:

The more protracted the convulsion the more probable it is that there is serious organic mischief,—not necessarily brain disease. I have in my mind a case of infantile spinal paralysis ushered in by convulsions lasting thirty-six hours. This proved to be a severe case, both legs and one arm becoming paralyzed.

Unilateral convulsion, though very suggestive of local brain disease, is not proof of it.

The convulsions which occur in cases of tumor of the brain are usually very characteristic. They are confined to one side of the body, or to the arm and face, or the arm alone, but very rarely to the leg alone. The movements are not violent; are seldom of long duration; not always, or for the whole time, accompanied by loss of consciousness; the part convulsed is liable to be somewhat paralyzed afterwards, and the paralysis, though very incomplete, seldom passes entirely away.

Temporary loss of power in a limb after a fit is not proof of a cerebral lesion; but if it lasts more than a few hours, especially if there be any tendency to contraction, it would suggest organic disease of the brain.

Squinting after a fit is not evidence of organic brain lesion, though if accompanied by stupor it probably would be.

If convulsions occur in a child suffering from acute lung disease, we should suspect tubercle. If the fit be followed by unequal pupils and squinting, this suspicion may become a certainty.

A fit in a child under one year of age, especially if the child be fat, is probably reflex; if the child be weakly and wasted (a condition in which reflex excitability is practically in abeyance), the probability is in favor of brain disease,—for example, tubercle. If the child be under two years of age or its dentition be not complete, the convulsions are probably not due to epilepsy; in older children it would be most difficult to exclude epilepsy, and after four years of age convulsions from reflex causes are rare.

An epileptic fit rarely lasts more than fifteen minutes, but it may be repeated indefinitely, and, when so repeated, may lead to organic brain disease,—for example, sclerosis of the cortex.

A CASE OF COMBINED ECHINOCOCCUS DISEASE AND TUBERCULOSIS.

CLINICAL LECTURE DELIVERED AT THE HOWARD MEDICAL SCHOOL.

BY CHARLES F. WITHINGTON, M.D.,

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GENTLEMEN,—The patient is a man of twenty-six, born in Italy. He came to America six years ago, worked for a year as a laborer, and for the last five years as a barber. His parents are both living and well. Fifteen years ago, in Italy, he had an attack of what seems to have been malaria. He has used alcohol to excess, but has taken none for the last six or eight months.

Two and a half years ago he was ill in this hospital, so that we are able to get at his record, which is especially interesting as bearing upon his present condition. He had at that time complained of epigastric pain for eleven days before entrance. There was ascites, for which he was tapped, and eleven pints of clear, straw-colored fluid were obtained. The abdomen refilled, and, as there was a well-marked consolidation of the apex of the left lung, although no tubercle-bacilli were found, he was transferred to the surgical side for laparotomy, which was performed November 7, 1898. The peritoneum was found much thickened, granular, and covered with tubercles. The appendix, which was encrusted with tubercles, was removed. Much fluid was evacuated and the abdominal cavity was drained. The patient did well, and was discharged in about four weeks, although as long as he was in the hospital the temperature continued to have an afternoon rise. Thus, you see, we are able to state that he had peritoneal (and in all probability also pulmonary) tuberculosis as long as two and a half years ago; but there is no evidence that his more recent malady had begun at that time.

He insists that after discharge from the hospital he was perfectly well and worked until October, 1900, when he was taken

with a sudden pain in the right axilla and back. With this came cough, shortness of breath, and abundant yellowish expectoration. He thinks he has lost twenty-five pounds of flesh in these succeeding five months, during the last four of which he has been in bed. There are frequent chills and sweating and his appetite is very poor.

On inspection, you will at once be struck by the patient's extreme emaciation. He has to sit up in bed to breathe, and this is the only exertion he is capable of. Despite his swarthy skin, he seems anæmic; examination of his blood shows reds four million seven hundred and thirty-six thousand, whites twenty-nine thousand two hundred, and hæmoglobin sixty-eight per cent. The tongue is dry, with a heavy brown coat. Pulse 150, of fair volume, with apparent thickening of the arterial wall.

On percussing the chest we find both fronts rather hyperresonant, the right more so than the left. Dulness begins, however, in the right back at the mid-scapula and increases in intensity downward, becoming flatness just above the angle of the scapula; the flatness extends to the axilla and front at the same level. Over the dull area respiration is obscured, and there are fine râles about the third rib in front, which give place to coarse, bubbling râles of a somewhat metallic character over the flat area. The voice-sounds and fremitus are present at the base, but are somewhat less than on the other side. At the left apex, where the signs of phthisis existed two years ago, there is now bronchial respiration, with sticky râles, most marked at the junction of the second rib with the sternum. The voice-sounds are rather exaggerated here.

Inspection of the abdomen shows a ventral hernia at the site of the old laparotomy wound. The upper edge of the line cannot be made out, as it joins the flatness of the thorax; but percussion shows it to be enlarged downward, and the edge can be felt running across and joining the lowest part of the costal arches on the two sides. There is no vestige of the ascites of two and a half years ago.

You will notice that his cough, which is very frequent, brings up an enormous amount of secretion. This is very dense, not fetid, and contains small yellowish particles suggestive of the color of bile. The sputum has been stained for tubercle-bacilli and several examinations made, with a negative result so far as tubercle-bacilli are concerned. A slide here, however, shows, in the midst of large

numbers of pus-corpuscles, small, yellow pigmented areas, in appearance like the larger yellow masses already mentioned. There have also been found, and are here present, *hook-shaped* bodies, with a sharp outline, having a length equal to the diameter of several pus-corpuscles. In contour they resemble somewhat the claw of a cat. They occur only singly, but they are the hooklets of the echinococcic cysts, and they are the significant element in the case.

The presence of these hooklets in the sputum in connection with the enlarged liver means, I take it, that hydatid cysts of the latter organ have perforated through the diaphragm and are being got rid of through the bronchi. The yellow pigment which I have mentioned is doubtless bile which has been discharged through the perforated diaphragm. As the physical examination of the chest is consistent with the diagnosis of consolidation and cavity formation in the lower right lobe, is it possible to remove any hooklets by aspiration of this area for purposes of further diagnosis?

To answer this question, I introduced a needle in the flat area a few days ago at two points, in the eighth intercostal space in the back and in the seventh in the right axilla. In both instances the needle appeared to be in a solid organ and no fluid could be withdrawn. In a few minutes after the operation the sputum was tinged with blood, confirmatory evidence that the needle had entered lung tissue.

Despite the failure to find tubercle-bacilli, we are justified, in view of the patient's history during his previous residence in the hospital, in saying that he has tuberculosis, undoubtedly involving the left lung (where there were signs two years ago) and possibly the right. The high white count, however, indicates that there must be something else, that something being doubtless the inflammatory reaction due to the parasite. The differential count indicates that this is a true leucocytosis. It is as follows:

Count of one hundred and eighty-six leucocytes:

Polymorphonuclear neutrophiles	79.2 per cent.
Lymphocytes	14.6 "
Large mononuclear	5. "
Eosinophiles	1.2 "

The urine shows a diminished metabolism (urea sixteen
Vol. III. Ser. 11—7

grammes) and an occasional hyaline cast, with frequent renal cells. No hooklets can be found.

To what are we to look for the cause of the hydatid infection in this patient? It is, of course, well known that the "bladder-worm" or echinococcus cyst is one of the two phases in the life-history of a parasite of which the other phase is the *Tænia echinococcus*. The former or larval phase is passed in the muscles or internal viscera of many animals, including some which are most commonly domesticated, the cat, the sheep, the ox, and the pig. It also occurs in the monkey and in man.

The other phase, that of the tapeworm, has a much more limited number of hosts,—*e.g.*, the wolf, the jackal, and the domestic dog. There is some doubt whether it occurs in the wild dog of Australia, in which country, however, the hydatid disease is particularly rife. It is certain that it does not occur in man.

Of the animals which can harbor the *tænia*, then, the domestic dog is the only one which by reason of its intimate association with man can produce the hydatid disease in the latter. This relation is only one of the many instances illustrating the importance of the new study which is coming to take a leading place in medical research,—the diseases common to or shared by men and animals. This *tænia*, as found in the dog, is a small one, the whole length being but about five centimetres and there being but three or four joints. The last segment only is the fertile one, and it contains some five hundred to six thousand eggs. These being passed from the intestine of the dog are ready to migrate from any stomach into which they may be introduced and to pass into a larval state in their new host. In the case of man, the ingestion of the ova may come by means of drinking-water or imperfectly cleaned raw vegetables or by being licked on the mouth by an affected dog. But as the *tænia* can only be propagated anew in a dog by the swallowing of the hydatid cyst, they would manifestly soon die out if no other animal than man could play the part of intermediate host. As dogs, however, are often permitted to eat offal derived from the bodies of pigs, oxen, etc., they have an opportunity, in case these other animals have had the larval echinococcus, to infect themselves, and thus the *tænia* stage is never lacking to the canine tribe and a constant source for fresh infection of men and other animals is provided.

The favorite habitats of the cysts of this particular parasite are the viscera. Cysts of allied organisms have a predilection for other parts,—*e.g.*, those of the *cœnurus* to the brains of sheep and those of the *cysticercus* to the muscles. Of all the viscera none is so liable to form the resting-place of the scolices *echinococcus* as the liver, and here their growth may give rise to enormous cysts.

Doubtless the liver was the original site of the development of the bladder-worms in our present patient. As we know nothing of his habits, we can only guess how he introduced the ova from some infected dog into his own stomach. The enlargement of the liver is probably due to these cysts, and the presence of the hooklets in the lung is due to a migration through the diaphragm, in which they have carried with them some bile-pigment.

The prognosis in the present case is very unfavorable, as the disorganization of the lungs has a twofold cause.

The treatment can be only palliative and sustaining. The question of surgical interference has, of course, been considered, and it was with the hope of some possible light in this direction that the aspiration was performed. We are cautioned in the books against introducing a needle in the case of a pulmonary hydatid, for fear of setting free a large amount of fluid into the bronchi and so drowning the patient. There seemed to be no sufficiently large accumulation of fluid here to warrant this anxiety, and the aspirating needle certainly did no harm, neither did it do any good.

[The subsequent history of this patient was one of progressive failure, and he died three weeks after admission to the hospital. The last examination of the sputum, on the day of his death, was rewarded by finding tubercle-bacilli. Unfortunately, no autopsy was allowed.]

THE PROPHYLAXIS AND EARLY DIAGNOSIS OF HEART DISEASE; PALPITATION AND ORGANIC DISEASE; TOBACCO AND HEART LESIONS; DIGI- TALIS; CURE OF HEART LESIONS.

**CLINICAL LESSON AT THE NEW YORK POLYCLINIC HOSPITAL AND SCHOOL FOR
GRADUATES IN MEDICINE.**

BY JAMES J. WALSH, M.D., Ph.D.,

Instructor in General Medicine at the Polyclinic, etc.

GENTLEMEN,—The discussions on diseases of the heart in certain sections of the last International Medical Congress at Paris were of great practical value, and have added significance to much of the recent literature on this subject. The renewal of interest thus awakened has been due not so much to the results of recent investigations as to new points of view. With the idea that they might prove suggestive and helpful to you in connection with the numerous heart lesions which we have been studying here, I have grouped together the more striking points in the recent literature.

PROPHYLAXIS OF HEART DISEASE.

Some one has well said that no profession is doing more to terminate its own usefulness than that of medicine. Certain it is that the first point discussed with regard to any disease is, very naturally, its prevention. At present the prophylaxis of heart disease, which usually results from some one of the infectious fevers or from rheumatism, is utterly inadequate. Despite much discussion of the various means proposed for the prevention of heart complications, little can be done except so to treat the patient's general condition that the infectious fever, the predisposing agency, may reach its natural termination as soon as possible. We are unable to limit the heart complication when it has once developed.

Although it is generally admitted that most diseases of the heart are due to rheumatism, there is no unanimity of opinion as to the true nature of rheumatism itself. The tendency of late has

been to regard it as an infectious disease. A number of micro-organisms have been described as occurring in the lesions and secretions of affected parts and sometimes also in the blood of rheumatic patients. They have been found most frequently on the rheumatic vegetations of the heart-valves. Most of the micro-organisms thus far described are to be regarded rather as the products of secondary infection than as the specific pathogenic causes of rheumatism. Professor Widal stated at the Paris Congress that he had tried in some fifteen recent cases of rheumatic polyarthrititis to secure cultures from the arthritic fluid of affected joints; but although he had used every culture-medium known to modern bacteriology, he had failed to obtain growths. As his work was done in connection with the Pasteur Institute of Paris, this would seem to exclude the possibility of rheumatism being due to micro-organisms that resemble any of the bacterial types now known.

While Professor Widal was unable to obtain cultures from rheumatic subjects, examination of the arthritic fluid of rheumatic joints makes it clear that rheumatism is an infectious disease. The cellular components of the synovial fluid in traumatic and rheumatic arthritis differ greatly. In rheumatic arthritis a large number of polynuclear leucocytes are present. These cells are always found in increased numbers where normal cells are endeavoring to protect themselves against a neighboring infectious process. Rheumatism seems particularly to predispose to secondary infection. It is for this reason that so many different forms of micro-organisms have been found in rheumatic subjects. It is probable that secondary infections play an active part in the chronic conditions which sometimes develop as the result of acute rheumatism, and that they are actively propagated wherever rheumatic lesions of the heart already exist.

Years ago it was shown at von Leyden's clinic in Berlin that bacteria artificially introduced into the circulation of animals affect the heart-valves only when these structures are already suffering from some pathological process. Autopsies on those who have died during an acute attack of rheumatism are very rare. The mortality from this disease is probably much less than one per cent., and even this low death-rate cannot be ascribed to the rheumatism alone, but in part to some complication. Examination of the heart after death occurring in the course of acute rheumatic endocarditis prac-

tically always reveals the presence of certain bacteria in the valves affected by the endocarditis. While various forms of bacteria are present, the majority differ in no respect from the ordinary pyogenic bacteria. In von Leyden's clinic a diplococcus was found with which an endocarditis could be produced in animals if intravenously injected after direct traumatic injury of the heart-valves by means of an instrument passed through the carotid. In Senator's clinic a form of streptococcus was demonstrated, and other kinds of micrococci are known to occur.

It is well known that bacteria may be present in the circulation and that they may be excreted by a healthy kidney without doing harm. The tonsils and the ring of lymphoid tissue in the pharynx are supposed to be the paths by which these bacteria enter the circulation. Attention had recently been called to the connection between angina and rheumatism. It has not yet been determined, however, whether this relationship is direct or indirect,—whether the specific agent which causes the rheumatism also causes the angina, or whether a rheumatoid condition of the patient predisposes to the tonsillar inflammation. In any case during an attack of rheumatism the mouth, the fauces, and the pharynx should be cleansed as thoroughly as possible. While the rheumatic fever lasts and the characteristic sweating continues, the mouth is likely to be dry, and swallowing, the natural cleansing process of the mouth and throat, is much less frequent than usual. Patients should, therefore, be advised to gargle several times daily and to spray the throat occasionally with a mild antiseptic solution. The procedure can do no harm, and in the present state of our knowledge would seem to be distinctly indicated as a means of preventing secondary infection and the consequent increased liability to endocarditis and other complications.

EARLY DIAGNOSIS OF HEART DISEASE.

A patient suffering from disease of the heart is by no means condemned to early death. Distinguished European clinicians have reported cases of disease of this organ, especially of the mitral regurgitant type, which have been under treatment and observation for from thirty to fifty years. Individuals over sixty years of age with distinct valvular lesions not infrequently present a history of having suffered from unmistakable disease of the heart for

twenty or twenty-five years. Patients suffering from heart disease who can and will take care of themselves may often postpone the impending dissolution that threatens them. To do this, however, they must learn in the early stages of the malady so to arrange their manner of life as to aggravate the heart affection as little as possible.

It is surprising how many cases of heart disease develop without the patient's knowledge. There are thousands of refusals every year by life insurance companies on account of heart lesions whose existence was unsuspected until revealed by the medical examination. Such patients often seriously injure their overworked hearts by needless exertion. Compensation is often perfect, but is disturbed by indiscretions that might easily be avoided. It is important, then, to bear in mind certain symptoms the existence of which should arouse a suspicion of heart disease. The latent form of heart disorder is most frequently situated at the mitral valve. Lesions of the aortic valve are less liable to be overlooked, because of the disturbance of the pulse which they occasion. Mitral lesions very soon affect the lungs. The congestion incident to mitral incompetency causes pulmonary hyperæmia, which favors the development of frequent attacks of bronchitis. The frequent occurrence of bronchitis in otherwise healthy patients, therefore, makes an examination of the heart imperative. Especially is this the case if the sputum occasionally shows pin-point drops or slight streaks of blood. This slight hæmoptysis often brings patients in great alarm to the physician with the idea that they have tuberculosis. An examination of the sputum will not show the presence of tubercle, but of the large cells, sometimes containing hæmatin crystals, which the Germans call *Herzfehlerzellen*, that is, heart-disease cells.

When cardiac compensation begins to fail, the functions of important organs are soon seriously disturbed. Usually one of the first to suffer is the kidney. At many of the German clinics the teaching in cases of compensated heart disease is that when the amount of urine passed begins to diminish cardiac compensation is being interfered with. An increase in the specific gravity with a decrease in the amount of the urine, even though it contain no albumin, should lead to an examination of the heart, and will often be found to be associated, either primarily or secondarily, with some affection of this organ.

In the same way gastric functions are often interfered with and

dyspeptic symptoms may be the first signs of failing compensation. It often seems inexplicable that one organ should suffer distinctly from circulatory disturbance at a time when other organs are apparently in excellent condition. The law of heredo-reaction to disease, established by French clinicians, which was discussed at the recent International Congress in Paris, would seem to furnish some explanation of this anomaly. According to this law, patients suffer from chronic disease first in those organs which because of heredity are in the least perfect condition. If lowered vital resistance of kidney tissue be hereditary, the disturbance of the circulation caused by beginning failure of heart compensation will give rise to renal symptoms long before its effects are manifested in other organs. In the same way, in dyspeptic families gastric disturbance will be the first symptom noted. It is important to remember, too, that in individuals whose nervous system is somewhat below the average of resistive vitality incipient heart trouble may simulate purely nervous phenomena. Dr. Jackson has recently called attention to the fact that not infrequently cases diagnosed as neurasthenia prove after a time to be instances of serious valvular lesion. When the first nervous symptoms are noticed, there may be nothing to call attention to the condition of the heart, or actual examination may be negative. When the same patients are seen some months or a year later, positive signs of chronic endocarditis may be present, although in the mean time there has been neither rheumatism nor infectious fever to account for its presence. The heart lesion, no doubt, existed previously and was the original cause of the nervous symptoms. Gradual failure of compensation and consequent hypertrophy and dilatation of the heart have since emphasized the physical signs of the heart lesion and rendered them unmistakable.

HEART PALPITATION AND CERTAIN PATHOLOGICAL CONDITIONS.

The question of the existence of some morbid condition of the heart as the basis of certain cases of palpitation is receiving much attention. Professor Huchard, of Paris, pointed out the fact that it is not unusual for palpitation to continue for from ten to fifteen years as an apparently functional disturbance of the rhythm of the heart due to some cause external to that organ, when suddenly or gradually symptoms develop which point to the presence of a pro-

gressive morbid process in the muscle of the heart or in its nervous mechanism. The pathological findings in cases of this kind have been rather unsatisfactory. In some of them Professor Huchard has recently found sclerosis of the left auricle.

CARDIOPTOSIS.

Visceral ptoses form a very interesting subject for investigation. The prolapsed organs heretofore reported have always been situated below the diaphragm. A contribution to the Paris Congress, however, described a condition of relaxation of the elastic tissue of the large vessels which allowed the heart to prolapse,—that is, to hang much lower in the thorax than normally. This prolapse causes displacement of the apex-beat beyond the nipple-line and enlargement of the lower part of the area of relative and absolute heart dulness. The pathognomonic sign of the existence of this anomalous condition is the absence at its ordinary upper limit of normal heart dulness. Besides, the examiner's finger pressed into the suprasternal notch fails to feel the aortic pulsation. As a direct consequence of marked cardioptosis respiratory anguish, painful dyspnoea, and precordial discomfort develop. Angina pectoris is said sometimes to be due to this condition. The cause is always an hereditary tendency to tissue relaxation. The symptoms, however, and the general thoracic conditions resemble certain phases of overcrowding of the thoracic organs sometimes produced by under-development or premature ossification of the bony framework of the thorax. Another condition, Virchow's hypoplasia of heart and blood-vessels, would be difficult of differentiation.

TOBACCO AND HEART LESIONS.

It was surprising to note how many medical men were of the opinion that tobacco sometimes gives rise to permanent heart lesions. The impression has long been growing that individuals who, though susceptible to the influence of tobacco, continue to use it, despite the occurrence of unfavorable symptoms, often develop not only the physical signs, but also the constitutional symptoms of a heart lesion. Von Leyden, of Berlin, several years ago stated, as his positive opinion, that tobacco alone is sufficient in certain cases to cause a valvular defect of the heart. Professor Mendel, of Berlin, also averred that in those who have an idiosyncrasy for it the use of

tobacco produces an arteriosclerotic condition which may involve the valves of the heart. A well-known physician from Constantinople reported the development of aortic heart lesions in three cases, in the histories of which he had been unable to find any of the ordinary causes of heart disease. In each instance, however, the patient had been an immoderate smoker; two had smoked cigarettes incessantly. These facts seemed to justify the conclusion that the heart lesions in the three cases mentioned were due to the excessive use of tobacco. Three French doctors reported similar instances. I was so much impressed by this unexpected condemnation of what is usually considered the harmless weed that I asked several prominent French clinicians who had not been present at the session for their opinion in the matter. I was assured that the belief that tobacco has an injurious influence on the circulatory system, and sometimes even produces arteriosclerotic conditions involving the aortic valves, is shared by a great many medical men in France. I was told also that in recent years, as the result of this wide-spread conviction, the habit of smoking had become very much less frequent among French physicians.

HEART DISEASE AND HEREDITY.

A number of cases of heart disease were reported in which corresponding lesions had existed in successive generations in the same family. This was not considered as an evidence of direct heredity. Few physicians believe that acquired characteristics may be transmitted to the next generation. The frequency, however, with which heart lesions of the same type occur in successive generations of certain families shows that there probably exists in such families an hereditary diminution of vital resistance in this important organ that renders it especially liable to infection. Where heart disease has been known to occur in a family for several generations, it is important that children should be protected as far as possible from even the minor infectious diseases. So mild an infection as mumps has been known to cause serious heart lesions in susceptible individuals.

DIGITALIS IN HEART DISEASE.

Digitalis remains, of course, the great tonic in heart disease, but the indications and contraindications for its use are becoming more

definite. Such distinguished authorities as Professors Potain and Huchard insist that in irregular heart action without any definite lesion digitalis often does more harm than good. When in addition to cardiac irregularity pain is present, patients are practically never benefited by digitalis. In these cases strophanthus usually acts very favorably, because of its soothing influence upon the pain. Professor Potain has found, in a long experience of cases of cardiac arrhythmia, that, even when the tincture of strophanthus fails to modify the heart rhythm, it seldom fails to alleviate the pain. Professor Merklen has called attention to the fact that digitalis never does any good in simple arrhythmia,—that is, when the heart is beating forcibly but irregularly. In asystole, however, when the heart misses an occasional beat, apparently because of fatigue of the heart muscle due to some inherent morbid condition, digitalis always does good. Not only does the asystole disappear, but the accompanying cardiac discomfort, which is often a source of serious annoyance to the patient, is greatly lessened.

In acute endocarditis the use of digitalis is always to be deprecated. The less interference there is with nature's efforts to compensate for the valvular affection when acute, the better. Caton, in his recent book, "The Prevention of Valvular Disease of the Heart," says, "Although we note the onset of a *bruit* with apprehension as an indication of endocardial mischief, I personally also feel that given the fact of active endocarditis there are in the mean time certain advantages secured by the existence of the regurgitation. These are: (1) Regurgitation lowers pressure within the ventricle, thus interfering less with the reparative process than would be the case if the intraventricular pressure were normal. (2) The lowering of pressure on the arterial side and the relative increase on the venous cause the patient to feel weak and disinclined to exertion, disposed rather for the recumbent position, thus establishing conditions more favorable for the arrest of the mischief and for repair of the injured valve.

"The use of digitalis or, for that matter, of any heart tonic at this time interferes with these conservative processes on nature's part. Heart action may fail so much as the result of the endocarditis that organic function in other parts of the body is lowered to an extent that makes the patient's condition dangerous. This is especially true if the circulation of the nerve centres is interfered

with and temperature disturbance or other serious nervous symptoms develop. Under such circumstances it may be necessary to employ a heart stimulant, despite its contraindication, as the lesser evil. The less persistent stimulants, as the salts or the aromatic spirits of ammonia, will then be found most useful and least dangerous. Their effect can be carefully noted, and their administration stopped as soon as there are no longer symptoms requiring their administration. In severer cases of prostration the alcoholic stimulants will be found of use, though their continued action for hours after their absorption must not be forgotten."

As to the treatment of acute endocarditis, we are reminded of a remark made by Cullen, the distinguished Irish physician, with regard to a cognate subject, pericarditis. His attention was called by a hospital resident to the fact that one of his patients in the hospital was suffering from pericarditis. The resident was very regretful for not having called his attention to the case before, as it seemed to him that precious opportunities for therapeutics had been missed. Cullen's reply was that under the circumstances the patient might be thankful that his pericarditis had not been noted, for, had it been, it would surely have been treated, and treatment for pericarditis more often did harm than good. The mere occurrence of a heart murmur in the course of an infectious disease does not mean endocarditis; but, even if it should, this is not an indication for treatment of the cardiac condition unless there are serious symptoms in other organs besides the heart itself.

Digitalis is evidently not now considered to be so universally useful in organic heart disease as it was once thought to be. In mitral incompetency it always does good until the heart muscle itself has become hopelessly degenerate. Many therapeutists question the value of digitalis in mitral stenosis, and the clinicians are coming more and more to agree with them. Therapeutists argue, on theoretic grounds, that to force the left auricle to exert enough energy to overcome the obstacle presented by a stenotic mitral orifice is to invite overdistention of the thin-walled auricle, and consequently further disturbance of the heart action. Clinicians have pointed out that in uncomplicated mitral stenosis the effect of digitalis can be readily perceived in a disturbance of the rhythm of the heart. Broadbent, for instance, points out, in his recent book on diseases of the heart, that in advanced mitral stenosis the heart

beats can often be coupled at will by the administration of digitalis.

In aortic incompetency digitalis sometimes certainly does good. In those cases in which manual labor can be done notwithstanding the existence of aortic incompetence, digitalis will nearly always prove harmful. What the patient needs under such circumstances is a change of occupation. If this may not be, then the muscle tonics, strychnine, and especially *nux vomica*, are the drugs to be used. It must be remembered that *nux vomica* is a natural product whose entire therapeutic effect cannot be obtained from its alkaloids alone. It will often prove effective when strychnine by itself fails. If digitalis be employed in the treatment of these cases of marked aortic incompetency that yet are able to continue hard work, it almost invariably produces discomfort and renders the patient less able to work than before.

Patients suffering from aortic incompetency who, because of constitutional symptoms, are confined to bed will usually be benefited by digitalis. Some observers believe that sudden death has been brought about by the use of digitalis in cases of aortic incompetency with advanced aortic lesions that are not associated with the mitral incompetency which so often accompanies and compensates for aortic disease. In those cases of aortic disease in which aortic incompetency has led to dilatation of the heart and consequent mitral incompetency, digitalis always does good, for the same reason as in purely mitral incompetency. In aortic stenosis, if the interference with the emptying of the left ventricle is sufficient to cause such back pressure upon the mitral valve as to make it incompetent, digitalis will do good. If, however, the functional symptoms of the heart lesion are due to an insufficient supply of blood in the extremities, digitalis will give no relief. In such cases the blood paths should be widely opened and the heart's work rendered as light as possible by the use of the nitrites. For this purpose nitroglycerin is, of course, very useful, although its effect is less lasting than that of other nitrites. When the system must be kept under the effects of the nitrites for some time, sodium nitrite is the more useful drug.

With regard to the use of digitalis in general, then, it may be said that where symptoms of mitral incompetency exist, whether due to a lesion of the mitral valve or to an over-dilatation of the mitral ring in consequence of other valvular lesions of the heart,

digitalis always does good. In other heart lesions its effect must be watched very carefully. In aortic stenosis it may cause a sudden fatal termination if the already overtaxed heart is whipped into overactivity by it. In the milder forms of aortic incompetence in which patients are still able to be about their usual avocation, it may add to their discomfort and make them less capable of doing their work. It is a very valuable cardiac tonic, but not a universal panacea for heart disease.

THE CURE OF VALVULAR HEART LESIONS.

The impression has long prevailed that heart lesions are not inevitably permanent, and that, especially at early stages, improvement and even radical cure are possible. The possibility of cure in recent endocarditis, which is becoming more generally recognized, was the topic of a very interesting discussion at the recent Paris Congress. Petrovitch, of Paris, reported seven cases of chronic endocarditis that had lasted for not less than six months, in which the valvular defect was completely cured by properly directed treatment. Each of these cases presented the physical signs of a definite valvular lesion, and was besides accompanied by certain constitutional symptoms of heart affection for which the patients had originally sought relief. All the symptoms and the physical signs disappeared after treatment varying in length from ten months to three years. The therapeutic method employed was the exhibition of potassium iodide in small doses—from ten to twenty grains a day—over long periods. The administration of the iodide was interrupted occasionally for two or three weeks and then resumed. To promote the sorbefacient action of the iodine, the actual cautery was applied about once a month over the precordial region. Professor Potain, the greatest living French authority on diseases of the heart, said that he had seen many instances of cure effected in this way, especially in young people. He never considered a case of heart lesion to be hopeless until persistent and long-continued treatment by the iodides and by precordial counterirritation had been tried in vain. In young patients this treatment, if persisted in, seldom fails to cause decided improvement and may lead to absolute cure.

Caton, in the work from which we have already quoted, says that the lesser degrees of morbid change in the heart-valves are susceptible of remedy. The doubtful point to his mind is the limit of time

beyond which hope of amendment is vain. No very definite limit can be given, because the acuteness of the destructive process varies in different instances. In general, however, he thinks that the chance of complete restoration is small if more than three or four weeks have passed without the observation of due care and precaution. This is especially the case in adults; in children and young patients the period during which repair is still possible is more prolonged. Caton is of the opinion that, if careful treatment is commenced at once and persevered in sufficiently long, restoration *ad integrum* takes place in the great majority of early cases.

As an adjunct to the treatment immediately after an attack of rheumatism rest is extremely important. In the treatment of the rheumatic attack the iodides should replace the salicylates after the first acute symptoms have passed away. They will limit the amount of valvular deformity that may follow the chronic endocarditis which is so often a sequel of rheumatism.

Even in long-standing cases of heart disease, provided degenerative changes have not taken place in other parts of the system, the hope of benefiting the valvular lesions by the iodides should not be entirely abandoned. Serious heart lesions that have lasted for several years and have produced marked deformity of the valves, if the murmur occasioned can be a criterion, have been known to disappear after a fresh attack of endocarditis due to some infectious disease. In children, for instance, serious heart disease has not infrequently been eradicated during the course of an attack of scarlet fever. In a word, the prognosis of heart disease is not hopeless until distinct general arterial changes begin to manifest themselves.

A CASE OF EXOPHTHALMIC GOITRE.

CLINICAL LECTURE DELIVERED AT THE ROYAL INFIRMARY.

BY ALEXANDER JAMES, M.D.,

Physician to the Royal Infirmary, Edinburgh.

GENTLEMEN,—The subject of this lecture is a man, J. S., aged twenty, a cooper, who was admitted on July 1, 1901, complaining of nervousness, swelling of the neck, and some huskiness of voice, and stating that he had been ill for more than four years.

His family history is fairly good, except that his mother died at fifty-three of some heart complaint and that he has lost a brother from phthisis. As regards personal history, he has had, as a cooper, very hard work to perform, but he is comfortable at home, is a total abstainer from alcohol and a light smoker. Of previous illnesses he gives a history only of having had whooping-cough when a child.

His present illness, he tells us definitely, began about four years ago. He noticed that his hand was becoming shaky, especially when he was writing, that palpitation occurred with any exertion or excitement, and that he blushed very easily. Those symptoms seem to have begun gradually; he never got any fright, and the only thing which he blames is that he found the heavy work of his trade rather trying. He kept on at his occupation, however, and in September last he found that his collars were getting too tight for him, so that he had to get larger ones. About last New Year he noticed that his voice became somewhat husky, and four months ago he had an attack of influenza, which laid him up for two weeks. Since then he has felt less and less fit for his work, and so he determined to come into the infirmary.

State on Admission.—He is a fairly well-built young man, five feet seven and three-quarter inches in height, and weighs about one hundred and fifty-four pounds. His muscularity is rather poor, and he is somewhat restless and fidgety. His temperature is slightly raised at present; it is 99.2° F.

As regards his alimentary system, all that need be remarked is that appetite and digestion are fairly good, and that the bowels move once or twice daily. His tongue is large and moist, and somewhat tremulous when protruded. His liver is of normal size.

Hæmatopoietic System.—The spleen is not enlarged and there is no appearance of any increase in size of the lymphatic glands. The thyroid is distinctly enlarged. Of its two sides, the right is somewhat the larger, but the isthmus can be seen distinctly filling up the suprasternal notch and adjacent parts. No great general pulsation of the gland is observable, but the hand placed over the right side detects a slight systolic thrill. Examination of the blood reveals richness in corpuscles and hæmoglobin, the former numbering five million four hundred thousand and the latter amounting to eighty per cent.

Circulatory System.—Examination reveals distinct instability. He has shortness of breath and palpitation on the slightest exertion or excitement, and he has noticed once or twice a tendency to faint. On examination of the heart, diffuse pulsation is noticed all over the cardiac area. The apex-beat can be felt slightly under the sixth rib, but internal to the nipple-line, and percussion reveals a slight general enlargement of the heart. The flapping character of the heart-beat, felt on palpation, indicates that there is dilatation rather than hypertrophy. On auscultation, the sounds are flapping in character, but over the mitral area can be detected a slight systolic *bruit*, which is heard also over the carotids, especially the right, and in this region a *bruit de diable* can likewise be made out.

The pulse-rate varies with excitement, etc. When he is quiet, it is about 104 per minute, and it shows a slight tendency to irregularity as regards time and strength, the volume is fairly good, and the pulse-wave abrupt.

Respiratory System.—As previously stated, he has some hoarseness, which he says began about six months ago. He tells us that he noticed it on waking one morning, and that then he had also some difficulty in breathing and a slight tickling cough. He is positive that on the previous evening his throat felt perfectly well. At present his respiration is entirely easy, and he has never noticed any special difficulty when lying on one side or the other. If we ask him to breathe deeply, however, a suspicion of stridor

can be made out, but if any pressure on the trachea exists it must be very trifling. Laryngoscopic examination reveals only slight catarrh and thickening of the cords.

With the spirometer we find that his respiratory capacity is only about one hundred and seventy cubic inches, distinctly less than the average for his height and age. Examination of his lungs, however, reveals nothing abnormal.

Integumentary System.—His skin all over his body is somewhat flushed and moist. His face is usually perspiring and a minute scratch at any part causes the appearance of a *tache*. He has a slight acne eruption on the shoulders and back, and his nails show a little thickening and furrowing.

Urinary System.—His urine is normal in quantity and in color, acid in reaction, and of 1025 specific gravity. It contains neither albumin, sugar, nor blood. On standing, a distinct mucous cloud can be made out.

Nervous System.—The brain functions are unimpaired, but he thinks that intellectually he is not so good as he was. He sleeps well at night, and his sight, hearing, taste, and smell are unimpaired. His muscles are somewhat flabby and he is more easily tired than formerly. Marked tremors are everywhere visible. As usual, they can be best seen when he holds out his hands, but, as will be further discussed later, may be noticed in the legs, head, etc., also. While his sight is good, there is distinct though slight prominence of the eyeballs. The pupils are equal, and somewhat dilated, but they react well both to light and accommodation. As regards reflexes, all that we need say is that both the superficial and the deep are active, but not exaggerated.

This then is our case, and now let us say a little more in detail as regards the etiology, symptoms, pathology, and treatment of exophthalmic goitre, taking up first its etiology.

This disease is specially common in women about adolescence; when it occurs in men, it is usually at a later age. Curiously, however, two of the last three male patients whom we have had in our wards were young men. As to what has brought the disease on in our patient, we cannot speak with any certainty. Hereditarily there is nothing far wrong with him and there is no history of mental worry or shock. There is little doubt, however, that his work has been rather laborious, and this has probably been the

most important factor in bringing on his disease. In our last young male patient with exophthalmic goitre there was a distinct history of both physical and mental overwork. He was a young officer in the mercantile marine and freshly home from a voyage in which he had undergone great hardships; he had started work for one of his examinations when the disease broke out.

Its onset is often rather sudden, and it is to be noticed that in our patient of to-day, although the tremors and palpitation evidently came on rather gradually and although the thyroid enlargement was slowly progressive, a distinct exacerbation seems to have occurred about the New Year, when the hoarseness and difficulty of breathing were noticed. Probably also the influenza attack had much to do in aggravating his symptoms.

Next observe that of the four cardinal symptoms of exophthalmic goitre—viz., the prominence of the eyeballs, the enlargement of the thyroid gland, the accelerated action of the heart, and the tremors—the one which shows itself first varies in different cases. In our patient it seems to have been the tremors and palpitation and next the enlargement of the thyroid gland. In the elderly male patient who was here some time ago it was apparently the exophthalmos, for he told us that what first made him realize that something was wrong with him was the fact that the street boys used to ask him what he was “glowering at.” There is little doubt, however, that the differences in the symptom which first draws the attention to the disease can be accounted for when we remember that, although the four cardinal symptoms are as we have stated, they are not all equally marked in each case. In our patient, for example, the tremors and the enlargement of the thyroid gland are more marked proportionally than are the exophthalmos and the tachycardia.

Let us next consider those cardinal symptoms in detail, and first as regards the tachycardia. In our patient, although the pulse is rapid and is markedly increased by excitement, this symptom is not a very prominent one. Pulse-beats of 140 or 150 are not uncommon, and cases have been reported where they amounted to upward of 200 a minute. With this rapid action of the heart, the carotids and other arteries pulsate visibly. Even the veins may pulsate, and with the ophthalmoscope pulsation of the retinal vessels is usually easily made out. In our patient this symptom is not very

well marked, but we think that it is present to a slight extent. With this excited action, the heart is usually slightly dilated. Organic heart disease is unusual, but lately in our wards we have had two female cases of this disease in which mitral stenosis and regurgitation were present.

The thyroid enlargement is usually general, but, as in our patient, the right side tends to be rather larger than the left. With the carotid artery, the gland pulsates visibly, as a rule, and anything which increases the rapidity of the heart's action, as excitement, etc., tends at the same time to make the gland larger. On palpation, a rustling feeling can often be made out, and, on auscultation, a murmur. Both of these can be detected in our patient, yet the gland is not very much enlarged and it feels rather firmer than usual. As a rule, however, the bigger the gland, the softer it is, and the more readily excitement causes its further enlargement.

The exophthalmos also is not very well marked in our patient. He shows, however, the "von Graefe" symptom,—i.e., when he is asked to follow the moving finger downward, the upper lid lags a little behind, so as to show the white sclerotic above the cornea. "Stellwag's sign"—i.e., widening of the palpebral aperture owing to retraction of the upper lid—is not markedly present, and "Moebius's symptom," or insufficiency of convergence, also is not marked. For example, when we make the finger approach his eyes, he can converge all through. If Moebius's symptom were present, we should find that, when the finger was close to the eye, the converging muscles would, as if weakened by their efforts, cease to act, and divergence would occur. Lastly, when we ask our patient to turn his eyes up towards the roof, some wrinkling of the forehead is noticeable. This does not occur in cases where the exophthalmos is very well marked.

In this disease the amount of exophthalmos is usually equal in both eyes, and it can often be noticed that whatever increases the tachycardia and enlargement of the gland—usually excitement—increases also the exophthalmos. Cases have been reported where the exophthalmos was more marked on the side on which the thyroid gland was the more enlarged. As already stated, in our patient the right side of the gland is rather the larger, and some of us think that the right eye is rather more prominent. It must

be admitted, however, that in this patient the exophthalmos is not a very prominent symptom.

The tremors in our patient are very well marked. When he holds his hands out in front of him, they are very readily noticeable. But it is to be observed that they are not by any means confined to the arms and hands. In his tongue when protruded, and in the muscles of his face, a general tremulousness is apparent, and when he stands erect and places a hand on his head a fine tremor can be felt. Similarly, when he stands or sits and holds out his leg, a general tremor can be seen and felt. By suitable apparatus the rate of tremor can be timed, and attention has been drawn to the fact that in this disease it is in the hands about nine per second, differing from the tremor of paralysis agitans, which is only about seven per second. In our patient we have found that in the hands it is about nine or ten per second and in the feet eight or nine per second. These are about the same rates as those of elbow and knee clonus, and the muscles concerned are probably mainly those of the upper arm and thigh respectively, while in paralysis agitans the muscles of the forearm are mainly those concerned in the tremors of the hand. In our patient the head clonus is too slight to be measured; it appears, however, to be of about the same rate as head clonus ordinarily produced,—*i.e.*, about twelve or thirteen per second.

Of the other symptoms which one looks for in this disease little need be said. Although the bowels move freely, he has no diarrhoea and he has never had vomiting. The flushed, moist skin certainly shows diminished electrical resistance, and the superficial and deep reflexes, though all active, are not distinctly increased. His temperature is ordinarily slightly elevated, being a little above 99° F., and, considering his flushed, moist skin and the loss of heat by radiation, by conduction, and especially by evaporation, which is always going on, we can understand that tissue metabolism must in him always be increased in activity. We are not surprised that he is thinner than he was, and that there is marked physical and nerve weakness, which has led to an incapacity for work, both bodily and mental.

As regards morbid anatomy, we have to remember that the enlargement of the thyroid gland and the prominence of the eyeballs are largely due to vascular dilatation. It is in this way that

we can understand how in typical cases the size of the gland and the amount of exophthalmos vary so markedly from time to time with excitement, etc. But with this change in the vessels there is in the gland also some hyperplasia and increase of its colloid matter, whilst in connection with the eyes there may be some increase of the fat or connective tissue of the orbital cavities.

In reference to pathology, it is believed that the disease is mainly due to a hyperthyria, or excess of the colloid secretion of the gland, acting powerfully upon the nervous system. With this excessive quantity, the quality of the secretion also may very probably be to some extent altered for the worse, and attention has recently been directed to the likelihood of the small structures beside the thyroid—the parathyroid glands—being likewise involved. By this secretion the entire nervous system is probably injuriously influenced, but certain parts have been mentioned as being specially affected. Thus, changes have been described as occurring in the cervical ganglia of the sympathetic. It has been said also that symptoms like those of exophthalmic goitre can be induced in dogs by destruction of the restiform bodies. Further, since the expression of face and other phenomena presented by a patient suffering from this disease much resembles the appearances of fright, it has been suggested that the part of the nervous system specially affected is the area concerned in the expression of that emotional condition.

Whether or not, however, there be any part of the nervous system specially affected, there is no doubt that this thyroid secretion acts as the nerve toxin, and an interesting comparison can be made between this disease and myxedema, in which, as we know, the thyroid gland is atrophied and the thyroid secretion is practically non-existent. To save time, I put the points of contrast side by side in the following statement.

EXOPTHALMIC GOITRE.

Hyperthyria—gland enlarged.
Female sex mostly.
Age from fifteen to twenty-five.
Single life.

Onset often sudden.
Skin soft and moist.
Pulse rapid.

MYXEDEMA.

Athyria—gland atrophied.
Female sex mostly.
Age after thirty.
Married women who have borne children.

Onset gradual.
Skin hard and dry.
Pulse slow.

EXOPHTHALMIC GOITRE.

Temperature subnormal.
Nerve torpor.
Amenorrhœa.
Pregnancy prejudicial.

MYXŒDEMA.

Temperature often raised.
Nerve irritability.
Menorrhagia
Pregnancy beneficial.

Curiously, we have in the ward at present a woman suffering from myxœdema, and she forms a good illustration of the general truth of this comparative statement. But a further point of contrast which we have made out between this case and that of exophthalmic goitre is in connection with the blood. In our goitre patient the blood, as we have seen, is rather rich in corpuscles and hæmoglobin; in this myxœdema case it is distinctly poor.

Lastly, as regards the treatment in exophthalmic goitre. Foremost comes rest, both physical and mental, and we often see how the enforced rest and quiet of the ward produce great improvement in a very short time. The diet should be simple and nutritious, and, as in heart cases, tea, coffee, alcohol, and tobacco should be limited or avoided altogether.

Of drugs many have been tried,—ergot, iron, arsenic, digitalis, strophanthus, and strychnine. In the wards I usually begin with belladonna, either alone or combined with iron, arsenic, or strychnine, and I think that of all drugs taken internally it has been the most successful in my hands. Of course it has to be taken for months, perhaps for years, but given in small doses, and stopping its administration for a week or so now and again, it seems to be perfectly safe. The chloride of calcium and the hypophosphites have also a reputation.

A form of local treatment which I have employed with some success for the last few years is the application of the red iodide of mercury ointment. A piece of the ointment as large as a pea is rubbed gently over the gland, and then the patient, with his face covered, is made to sit in the full sunlight for half an hour or so, until the ointment dries somewhat. If there is no sunshine the patient can similarly sit before the fire. After three or four days the skin of the neck over the gland is apt to get red and tender and the treatment may have to be interrupted. I certainly, however, have seen much good result from its employment. In cases of great tachycardia and gland enlargement the ice-bag or ice-coil over the lower part of the neck has been recommended. If the exophthalmos

is very great, the use of a light bandage has been advised, and in extreme cases the diminution of the opening of the eyelids by means of a surgical operation has been tried.

As will be readily enough understood, thyroid feeding has proved as harmful in exophthalmic goitre as it is beneficial in myxœdema. But both thymus and suprarenal tissue feeding seem to have afforded good results.

Electricity, both galvanic and faradic, has been highly recommended. With the galvanic current the anode may be placed over the nape of the neck and the cathode over the gland, but the current may be passed in other directions,—*e.g.*, from the nape to the side of the neck, to affect one sympathetic; from below one mastoid to below the other, to affect both sympathetics, etc.

Lastly, surgical interference, either by ligature of the thyroid artery or by removal of a lobe or a portion of the gland, may in inveterate cases be resorted to, and I know of several instances in which this has been done successfully. To describe the steps of the operation would be out of place here, but it is interesting to bear in mind that in the operation the required division of thyroid gland tissue should be done with the cautery. In former times, when the knife alone was used, the escape in large quantity of the thyroid secretion and its absorption by the blood after the operation caused undoubtedly in certain cases rapidly fatal results from thyroid poisoning. I have known also of instances where electrolysis of the gland led to similar escapes and unfortunate results. Moreover, there is no doubt that in this disease chloroform administration has special risks.

In carrying out our treatment of exophthalmic goitre it is always to be remembered that, except in the few recorded cases which have been very rapid and fatal, the course, though tedious, is ordinarily not very serious. I have had several cases which completely recovered in from one to three years, and a very large number in which after a time an arrest and amelioration of one or other of the symptoms occurred. Hence only in long-standing and persistent cases will surgical interference be required.

CARDIAC DISEASE (PANCARDITIS) DUE TO LEAD POISONING; SYPHILIS OF THE THROAT; PHANTOM TUMOR OF THE ABDOMEN IN A MALE.

CLINICAL LECTURE DELIVERED AT THE PHILADELPHIA HOSPITAL.

BY SOLOMON SOLIS-COHEN, M.D.,

Physician to the Philadelphia Hospital.

CASE I.—CARDIAC DISEASE (PANCARDITIS) DUE TO LEAD POISONING.

GENTLEMEN,—The first patient whom I shall show you this morning is a man who seven weeks ago suddenly became unconscious and fell while walking along the street. He had a premonitory sensation of tinnitus—to use his own words, “as if some one was blowing a horn”—in his left ear—and felt numb in the whole left side. He says that he did not actually fall, but would have done so had not some one caught him; he was carried into a drug-store, where he remained until consciousness returned. On account of feebleness of the left leg, it was necessary to have some one help him home. Soon after this he was able to walk and has had full control of his extremities ever since; in the mean time he experienced no difficulty in speech or deglutition; his head remained perfectly clear and he has not had vertigo. He states that he has had no similar attack before or since. Upon admission, some three or four days after the seizure described, he complained of pain over the precordia, of shortness of breath, and of pain and stiffness in the joints of the lower extremities.

His family history is of no special moment. As to his past medical history, it is noted that he had in childhood measles, scarlet fever, and mumps. When about seventeen years of age he had an attack of acute inflammatory rheumatism and at twenty-three he had malaria. Rheumatism has recurred a number of times. He has had several falls due to the breaking or giving way of scaffold-

ings on which he was working in his occupation as a painter. At one time the left clavicle and some ribs on the left side were fractured; at another time a hook caught his right elbow, severing the vessels and lacerating the tissues.

On examining his teeth, we find they are very bad; the gums are ulcerated away from the roots of the teeth, and around the margins of the lateral incisors of the lower jaw is a dark purple line, which, however, is not very characteristic of what you all know I am looking for. In persons who clean their teeth one never finds a lead line, no matter what their occupation, but the line is frequently found in the mouths of people to whom the tooth-brush is a luxury rather than a necessity, and ulceration is often present. One does not usually look on the inner aspect of the gums for the lead line, but sometimes it can be found there when it is not apparent elsewhere. When there is doubt as to the exact character of the line, a strip of white paper or thin white card should be slipped thus between the mucous membrane and the teeth, when the blue line will appear more distinctly, being contrasted with the whiteness of the paper. If this is not sufficient, a little piece of mucous membrane may be cut away and looked at under the microscope, when distinct black dots of the lead sulphide will be seen. The manner in which the lead line is deposited depends upon the presence in the mouth of hydrogen sulphide or other sulphur compound, which unites with the lead circulating in the blood and leaves the lead line on the gums.

The patient is a single man. He states that he has used alcoholic beverages and tobacco moderately. He has had but one attack of colic, which was accompanied by constipation and was called painter's colic. This is the usual history of a case of lead colic that is associated with constipation. He has been short of breath for several years. Two weeks before admission to this hospital, on October 14, he got wet and continued to work in his wet clothes. The next day he complained of cold in the head, pain in the thorax, swelling of the joints in the lower extremity, fever and headache, and was compelled to stay in bed nearly ten days, during which time constipation was marked. Feeling better, he went into the street and fell as before recorded.

He is a well-nourished man and his complexion is fairly ruddy.

On physical examination, we find that the pulmonary resonance

is good anteriorly and posteriorly. Inspiration and expiration are both too short, but I do not detect any abnormal sound. Since he has been resting in the hospital he has not been troubled with dyspnoea, but still has pain in the precordia. Cardiac dulness above begins at the third interspace and does not reach quite to the right border of the sternum. The apex beat is in the sixth interspace and nipple line; it is feeble and at times cannot be felt,—that is to say, two, three, or four beats will reach the surface and be felt by the palpating finger and then a beat will be missed. The pulse at the wrist is irregular, frequent, feeble, small, and occasionally misses a beat. The tension is very low and the artery is easily compressed. Auscultation at the apex shows at the present moment that the first sound of the heart is duplicated, but irregularly so,—that is to say, not at every systole. A murmur is heard which is rough, distinctly systolic, and transmitted into the axilla, but at the present time I cannot hear it beneath the scapula; this may be due to the fact that, with all the courtesy and attention of the class, there is necessarily considerable noise in the room. At the left of the sternum in the third interspace there is a distinct systolic murmur, which appears to be the same in quality as that heard at the apex, but not so prolonged. At the junction of the second costal cartilage with the sternum on the left, and in the interspace beneath it, there is a murmur. On the right at the aortic cartilage there is a systolic murmur, which, however, is very feeble and somewhat musical, though of low pitch. This murmur is heard distinctly in the vessels of the neck, as is also the diastolic sound which should normally be heard. Such are the murmurs I hear at the present time, but just before we came into the room I listened to the patient's heart and the murmur at the apex was partially presystolic. It began before the systole and extended into the first portion of the systole, while now it begins distinctly with midsystole and continues to the end of the systole. I think every time we listen we find the murmur somewhat different from that heard on every previous occasion. The notes stated that on admission a rough churning double murmur was heard at the apex and transmitted into the axilla, but the rib-rhythm was hard to distinguish. Two days later the heart sounds were rough, but there was no murmur.

Examination of the urine showed that the color was yellowish, specific gravity 1015, reaction acid, and sediment slight; micro-

scopically there were amorphous urates; chemically there was no albumin and no sugar.

I will reproduce on the blackboard as nearly as possible the pulse tracings on admission and a week later. You see that after this week of rest one cardiac cycle occupied nearly the time that two cycles had occupied on admission. There is irregularity in the shape and size of the curves in both tracings, and the latter one, with its shorter upstroke and widened and flattened aortic wave, seems to indicate some obstruction to the outflow of blood from the heart not shown in the first one. What is the diagnosis?

The man came in with a history of loss of consciousness, with temporary numbness and paresis of one side. This indicates some disturbance in the cerebral circulation the nature of which is to be determined. Had it been a hemorrhage, we should not have had everything passing off in a few moments and the man regaining perfect power shortly thereafter. Neither is such the history of thrombus or embolus. In cases of gumma such premonitory attacks sometimes occur, to be followed later by more emphatic symptoms. Here after seven weeks we have no further symptom. It was, therefore, simply a functional disturbance of the circulation, rather in the nature of syncope, the withdrawal of blood from the brain. It is true that the unilateral character of the numbness and paresis is against such a supposition, but the totality of the case is against everything else. The cause of the cerebral disturbance is the irregularity and imperfection of the action of the heart.

Now, what is the cause of this irregularity and imperfection of the cardiac action? We have to distinguish first a mechanical cause and secondly a pathological cause. The mechanical cause is the inadequacy of the cardiac muscle. You will probably ask if there is no valvular lesion, in view of these distinct murmurs. But the murmurs are not so distinct as they are irregular. At one time they are systolic and at another time presystolic; at one time they are heard best at the base and another time are more marked at the apex. Sometimes they are transmitted and sometimes not; and sometimes they are plainly heard while at other times they are not heard at all. While there may be some permanent lesion of the mitral valve, as exhibited by the fact that when the heart is working at its best there is a rough systolic sound at the apex, yet the lesion is hardly one which permits of much regurgitation or interferes

seriously with the distribution of the blood. The fault in circulation is due to a myocarditis, a degenerative process affecting the cardiac muscle itself. Now, what is the cause of this? It is hard to say. He has had rheumatism, which is a sufficient cause, and he has had lead poisoning, which is a sufficient cause; but I am inclined to lay more stress upon the lead poisoning than upon the rheumatism. He has also used alcohol to some extent, and perhaps all three poisons have contributed their share to the present trouble. Syphilis is a frequent cause of myocarditis, not often clinically emphasized. Our patient, however, denies syphilis, and we have found no evidence of it elsewhere.

I want to impress upon you the frequent association of cardiac lesion with chronic lead poisoning. I remember a case at the Jefferson Hospital fifteen years ago which I had an opportunity to watch for a number of years. The case came in first as one of lead colic; next as one of endocarditis; next as one with a chronic mitral lesion, finally developing an aortic lesion, and then came interstitial nephritis. I left the clinic at this time, and I do not know what the case has shown to my successors. Probably many of the cardiac and kidney lesions due to lead are otherwise attributed; but in this case the history was clear.

Another lesion associated with lead poisoning which is not often seen was illustrated by a second case that I saw at the Jefferson Hospital about the same time,—namely, large gout-stones on the fingers. You have often heard of poor man's gout and of lead-gout. Properly speaking, these conditions should be called uratosis, for, while chemically allied to gout and clinically resembling it in many respects, they are etiologically quite different. In the descriptions of gout in English literature you will often read of these chalk-stones. It is said that lecturers have used them to draw diagrams on the blackboard. In England they occur in those who have lived too high or who have been careless in their choice of ancestors. The only case that I have seen in this country, however, was the one in a poor patient I have just told you of. He was a painter, and he had parenchymatous nephritis as well as gouty concretions in the knuckles. Two conditions, lead poisoning and poverty, contributed each its share towards the condition. Dr. Leffmann examined the stones and found them to be composed of sodium urate, as in the cases reported from England.

The condition here, then, is probably one of mitral thickening, interposing a slight obstruction to the passage of the blood into the ventricle from the auricle and also allowing the valves to leak a little when the systolic contraction occurs, which would account for the fact that we hear at times a presystolic and at other times a systolic murmur. A slight thickening of the edges of the valves is probably present, but not the button-hole narrowing or other fixed obstruction as in a case of adhesions. Significant in this respect is the absence of the thrill which we would be likely to find in a case of mitral stenosis due to adhesions. More important than this slight lesion of the valve is the impaired nutrition of the cardiac muscle, due to the concomitance of several causes. This is manifested by the enlargement of the cardiac area, the feebleness, irregularity, and intermittence of the cardiac contraction, the want of synchronous action between the right and left ventricles, as shown by the occasional reduplication of the first sound, the irregular and transient murmurs, the want of filling of the pulse.

Now, how shall we treat this patient? First, by rest; second, by the exercise and baths to which I referred at our last meeting, —i.e., the Schott system of gymnastics and the Nauheim system of baths. In addition he should be given an alkaline course, and, if there were any symptoms of recent lead poisoning, which there are not, he should be put upon magnesium sulphate or sulphuric acid and potassium iodide. That potassium iodide does any good in ridding the system of lead has been disputed, but clinical experience must be placed against laboratory experiments. Clinical experience has shown that potassium iodide is of service in metallic poisoning generally. As we cannot in this house at present employ the gymnastics and baths, we must fall back upon drugs, and the question arises as to what drugs. The heart's action is extremely irregular, as shown by the duplication of the first sound, the dropping of a beat, and the irregularity of the murmurs. Nothing is equal to digitalis as a regulator of irregular hearts, but in order for digitalis to be successful there should be some healthy cardiac muscle to respond. It is well to try digitalis in such a case, but not to continue its administration too long. It should be given for a week or two while the patient is kept at absolute rest in bed, and then the results obtained should guide us as to its continuance or discontinuance. In addition, such details as measuring the urine,

watching it for albumin and casts, keeping up the movements of the bowels, etc., as well as regulating the diet so as to avoid embarrassing digestion and throwing extra work upon the heart are also of importance. It is necessary to administer the most nutritious food for the support of cardiac muscle, which suffers with the organism as a whole from want of nutrition. The organism as a whole suffers because the cardiac muscle is incompetent, and thus we have a cycle of self-perpetuating cause and effect. If we find that digitalis does not answer the purpose or conclude for any reason that we have given it long enough, it is then advisable to substitute some such combination as strychnine and sparteine or strychnine and strophanthus or strychnine and caffeine. I have not found sparteine or strophanthus or caffeine alone a complete substitute for digitalis. Strychnine is advisable as a general nerve and muscle tonic as well as a special cardiac tonic. If the pulse tension is high, if there appears to be considerable opposition to the inflow of the blood either to the ventricle or to the aorta, if we get continually such a tracing as in this case, with the upstroke cut off and the aortic notch lengthened and broadened, we should give nitroglycerin. The indication will be found either in the pulse-tracing or in the tension, smallness, or hardness observed upon palpation of the peripheral arteries. Nitroglycerin relaxes the vessels, and is also useful in conjunction with digitalis, because digitalis sometimes has an untoward effect in heightening the arterial tension, thus measurably counteracting the good results that we expect to get from its action upon the cardiac muscle. The combination of digitalis and nitroglycerin is both scientifically sound and practically useful. In relation to sparteine many physicians report disappointment, and I also reported disappointment in my early use of the drug; but this was because I did not employ it properly. It must be used in relatively large doses. A good way is to administer half a grain hypodermatically and follow it in two hours by another half-grain given in the same way. Afterwards it may be given in the same dose and at the same intervals by the mouth, for several days if a diuretic effect is sought, but for twelve hours only if the heart alone is to be influenced; after this the dose is to be governed by the effect produced. In administering sparteine merely for moderate cardiac action the best method is to give half-grain doses three times a day and then increase or diminish the

dose and the frequency of administration according to the effect; in other words, the drug is used freely until the heart is under its influence, and after this the effect can be kept up by smaller doses at longer intervals. The effect of an efficient dose will last for from twenty-four to forty-eight hours after the drug is discontinued.

CASE II.—THROAT SYPHILIS; DIFFERENTIATION FROM TUBERCULOSIS.

The second patient complains of pain in the head and eyes, soreness in the throat, difficulty in swallowing, and a hoarse, altered voice. The first thing that attracts our attention is the quality of the voice, and on looking into his throat the cause is apparent. The posterior palatal arch is adherent to the pharynx on both sides, and there is a stellate white cicatrix on the right. The uvula is gone; an ulcer at its former site of attachment extends partially into the hard palate, and surrounding the ulcer are pus and mucus.

What is the diagnosis? Syphilitic ulceration of the palate. One has only to look at it to recognize it. The man denies the initial lesion, and it is quite possible that he does not know anything about it. It is not at all rare for men who ordinarily tell the truth to deny the occurrence of the initial lesion, and when they are not in the habit of telling the truth it is still less rare. Often the denial is sincere; the chancre has been concealed within the urethra or has been too slight to attract attention. Then, too, the infection may have been conveyed non-venereally, as by the instruments of a careless dentist. The voice at once calls attention to the fact that there is some trouble with the palate, because the current of air is partially cut off from the nose and there results what is called the nasal voice.

The diagnosis lies between syphilis and tuberculosis, but tuberculous ulceration of the palate of this nature is not often seen, and it would be accompanied by an intense, wide-spread pharyngeal ulceration, with fever and evidence of an acute septic process. Acute pharyngeal tuberculosis is by no means so rare as may be imagined by those who have not seen it or read of it. It was for a long time confounded with syphilis. The first case that I saw was one that had been mistaken for syphilis by a good observer, and the patient was, I believe, hurried to the grave by the admin-

istration of potassium iodide, as this will always make a tuberculous patient rapidly worse. A physician once reported a large number of cures of laryngeal tuberculosis by the administration of potassium iodide, but the general consensus of opinion was that he had mistaken cases of syphilitic laryngitis for cases of tuberculosis. The therapeutic test can be made in cases of doubtful diagnosis, but it is better to make cultures of the secretion of the throat and then to perform the biological test of injecting the cultures into susceptible animals, before giving potassium iodide to a case in which one suspects tuberculosis of the pharynx. There are some gross appearances, however, the absence of which may suffice to render certain the diagnosis of syphilis. In tuberculosis of the pharynx the first appearance after the preliminary injection of the mucous membrane is what formerly was termed a deposit and now is called an infiltration in the mucous membrane of little tubercles, which look very much like fish-eggs. They are transparent granules about the size and shape of the eggs seen in shad-roë or other forms of fish-roë with which you may be familiar. The tubercles coalesce, break down, and their place is taken by ulcerations, which are surrounded usually by a well-marked reddish line of demarcation. The bed is shallow. The edges are everted. In syphilis this succession of phenomena does not take place. The lesions of tuberculosis are irregular, while those of syphilis are, as a rule, symmetrical. In tuberculosis there is usually considerable pain as well as acute febrile symptoms, while in syphilis these may or may not be present. As a rule, there is relatively little pain in ulcerative syphilis of the throat, and the acute constitutional symptoms are not manifested, because it is a tertiary and not a primary or secondary process. Another indication that this patient has syphilis and not tuberculosis is given by the adherence of the posterior arches upon both sides of the pharynx, and the white scar, indicative of a long-standing process, which is not the case in tuberculosis.

This man will be treated with potassium iodide and mercuric chloride pushed to the point of tolerance. Gradually cicatrization will take place over these ulcerations.

CASE III.—PHANTOM TUMOR.

The third case may or may not demonstrate what I want to show. This man has a resisting mass to the right of the umbilicus, sometimes above it and sometimes below it. It is dull upon percussion and is now quite resistant to palpation. When he sits up it becomes even more marked. It occupies now the right of the epigastric region and is projecting towards the left. By a lively stretch of the imagination I can believe that I outlined the stomach above this mass. The patient complained of a feeling as if there was a constricting band around the waist, particularly in front. There is no evidence of locomotor ataxia, lateral sclerosis, or organic nervous disease of any kind. When we can get rid of this mass, as we do at times, we can make out that there is an increase in the area of hepatic dulness.

This is a case of so-called phantom tumor, which is much more common in women than in men, but, as you see, it is occasionally found in a man. It is due to an irregular spasmodic contraction of certain groups of muscle fibres, under the influence of strong emotion, perhaps also as a result of the absorption into the blood of the products of intestinal fermentation. The subjects are chiefly, but not wholly, hysterical. When the condition is absent, it can sometimes be reproduced by percussion over or around the affected area, so that while it is in part due to morbid suggestion, it is not entirely, or perhaps not at all, under the control of the patient's will. Unless one observes the case carefully and notes the appearance and disappearance of this mass under certain circumstances, he will be very likely to miss his diagnosis, and diagnose it as a tumor of the ovary, the uterus, the omentum, the stomach, the liver, or any other organ in the region indicated by the tumor. I have never seen such a case operated upon, but I have seen one mistaken for an operable condition, the tumor disappearing when the patient was placed under ether, preliminary to a proposed section.

Speaking of errors in diagnosis of the pelvic organs and their location, I would refer to a mistake that I saw and in fact in which I participated. There was in a certain hospital a patient who had apparently a large tumor of the abdomen springing from just above the pubes. The gynecologist was unable to determine its exact

nature and decided to explore the abdomen. While the patient was under ether the medical men were asked to examine the patient and see if they could suggest the nature of the mass. This being impossible, an incision was made and the mass removed. It proved to be the stomach, and, of course, the patient did not recover. It is well to be wise after the event and to suggest that an attempt to outline the stomach in its proper position should have been made, whether by simple percussion, by percussion under dilatation, or by the use of a gastrodiaaphane. The physicians were not consulted in time for this, and might have failed to think of it if they had been consulted earlier. They will never fail in similar cases hereafter to make proper examinations or to decline to make any. This is a point which the class would do well to remember. The walls of this stomach were enormously thickened and the mass was adherent to everything around it, so that diagnosis by palpation prior to operation was simply impossible. The microscope, I believe, showed sarcoma.

While such cases are rare, cases of considerable displacement of the stomach are relatively frequent; they are more common in women than in men, but occur in both sexes. They are to be recognized only by carefully defining both the upper and lower curvatures of the stomach.

I presented here before the class a year or two ago a patient upon whom the electric light (Euhom's gastrodiaaphane) was used to determine the condition present. The lamp having been passed by way of the œsophagus and the current turned on, the transilluminated zone was distinctly visible just above the pubes, and it was evident that we were dealing with a case of extreme gastropotosis. As other viscera are usually involved in the displacement, the condition is sometimes called splanchoptosis and sometimes Glenard's disease, Dr. Glenard having first described it. It is, as I said before, more common, both in men and in women, than is recognized. The examination should be carefully made when the symptoms indicate dilatation of the stomach or when it is possible that obscure symptoms might be explained by detecting malposition of the viscera.

CLINICAL TREATMENT OF INEBRIETY.

A LECTURE DELIVERED BEFORE THE NEW YORK SCHOOL OF CLINICAL MEDICINE.

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THE medical treatment of inebriety is becoming more and more prominent in all circles of practice. The recent text-books of medicine and therapeutics not only give prescriptions for alcoholism, but also describe the symptoms and give details of the pathology and of complicating diseases. How far the effects of alcohol have been active causes of disease is the topic of an increasing number of papers, journals, and addresses.

Both general and special practitioners are called with increasing frequency to give help to persons addicted to the habitual use of spirits or of some drug. Many of these calls are for emergency cases, where the patient is delirious or is stupid and comatose, or hears threatening voices and sees terrifying objects, or talks of suicide. The family and friends are alarmed and the physician is called. In other more common cases the patient after a prolonged carouse feels the need of medical care, and begs of his doctor to give relief, to do something which will prevent him from suffering in like manner. The physician is not clear about the best means to be used. If he prescribes opium in any form, chloral, or other narcotics, the increased delirium or profound stupor may be followed by sudden death. His anxiety is enhanced by the thought that the narcotic may have been the cause of the trouble. If he gives emetics or drugs of like character, the depression is augmented. Remedies recommended in the text-books are not satisfactory; hence there are difficulty and doubt, which are shared by the patient. After some experience of this kind the doctor is dissatisfied, and the patient drifts off into some gold-cure asylum or takes secret drugs and seems to recover. Then he goes about giving the most extravagant praise to the means and remedies used.

To the physician there is a great certainty that no new remedies have been employed, and that the managers and medical men who conduct these places or give the specifics are neither reliable teachers nor scientists and do not possess anything which could not be known by every practitioner. When members of old families who have been devoted friends of the physician obtain relief from such doubtful sources and by such mysterious means, a feeling of regret comes over the doctor's mind that he should not have been able with all his knowledge and training to have the same success as the quack.

In almost every neighborhood there are persons who become disabled from the use of spirits and drugs and seek medical aid, and a still larger number of persons are alarmed at the imperative nature of their morbid drink impulses and consult a physician. There is a consciousness in the minds of both patients and friends that these morbid impulses may explode in some phase of insanity, attended with extraordinary conduct or criminal acts which may be very serious. The brief duration of these cases makes them tolerated by both the family and community, the public becomes apathetic, and the physician, after trying various means without success, falls back into the same routine and regards the case as a general hysterical condition in which the will of the patient is very largely at fault. This unsatisfactory experience in obtaining physical help sends innumerable patients back to the moral remedies, such as the pledge, the prayer, the persuasion of friends; and the result is a startling increase in the chronicity and incurability.

Most students know that the medical treatment of inebriety three thousand years ago was far more practical and scientific than much of the means used to-day. On the walls of the tombs of Thebes are pictorial representations of the treatment given in that early time, showing the administration of drugs, emetics, and cathartics, the use of massage, flagellation, showering with water, inunctions of the body, and other attempts to counteract the narcotism of spirits. Records of the early Greek physicians give minute directions for the treatment of excessive wine-drinking by mineral salts. Many of the old philosophers left very sensible rules for the restoration of persons suffering from the stupor of drink. These far-away prescriptions of means and methods are found to be thoroughly scientific and to indicate a clear conception of the disease and its treatment.

As I have already mentioned, the inebriety of to-day is a neurosis involving both brain and nervous system, and the modern scientific treatment must be based on this fact. The first exact treatment ever attempted for inebriety as a disease began at Binghamton in 1864. From this time the medical study and treatment of inebriety has been along lines of more or less scientific exactness.

This first asylum at Binghamton passed through the various stages of opposition which all new truth encounters. First, a period of denial; then, half acceptance, with empiric and secret methods; finally, full recognition. During the existence of this asylum the medical treatment was stoutly opposed and considered erroneous. The house was closed, and other institutions took its place. Then came the second stage of partial recognition of the possibility of means and measures for the cure of inebriety, and this is the period in which quacks and empirics have flourished. Happily this era is fast passing away.

There are now about thirty asylums devoted in whole or part to the medical treatment of these cases in this country, and an equal number in Europe. Already there is beginning to be some classification of the inmates, also some settled plan of treatment founded on exact scientific study. As in all other new fields, there have been a great many experiments which have been failures. Inebriates are difficult to treat, requiring special surroundings and conditions and great expertness and judgment in their management. A number of asylums have been abandoned, owing to the difficulties of treatment and control. In reality the inebriate is more curable than the insane, but the treatment must be based upon knowledge gained by accurate study of the conditions which both cause these toxic disorders and follow them. Some of these conditions which are recognized may be outlined in the following.

First, there must be a study of the hereditary causes of retarded brain growth, entailing instability with morbid tendency and feebleness of control. Second, the influence of traumatism from concussions, injuries, heat-stroke, or shocks to the nervous system; also wasting diseases of childhood or later life, and their sequelæ. Third, the starvations, excesses, drains, and strains which have provoked the use of spirits; also the contagion of environment. Fourth, the family relations to insanity, epilepsy, hysteria, and general nerve

and brain disorder. Fifth, the explosive and convulsive symptoms, such as the gathering and bursting of nerve energies at stated intervals, and the derangements which precede and follow them. From this study of causes the pathological effects must next be determined. How far has the use of spirits intensified all previous degenerations and formed new pathological conditions and new sources of disease? What organs have suffered most seriously? How far is the demand for alcohol a symptom or an exciting cause? Then comes the question of classification. Is the patient a paroxysmal inebriate or does he belong to the delusional class or is he of the senile or demented type, or is he a mixture of these types? Having ascertained these facts, the question of treatment resolves itself into the application of special means and measures which will specifically apply to the class and the case.

The fact should always be recognized that the drink impulse is a self-limited one and will die out under favorable conditions. Where the exciting and predisposing causes can be clearly marked out, their removal is the first step in the treatment. Nearly all cases which come for treatment have passed the early stages and are approaching chronicity; hence, are more difficult and require longer treatment. If the patient goes to an institution, it should always be at some distance from his home, among new surroundings and altered conditions of life. The mental effects of being among strangers in changed conditions of life and living are always very valuable in breaking up old conditions and habits.

In all of these cases there are three prominent conditions to be overcome,—viz., poisoning, exhaustion, and starvation. The poisoning comes not only from the toxin of alcohol but also from other toxins and ptomaines which have been or are being formed in the system from favoring conditions of soil and growth. Exhaustion from the continuous depression of narcotism and the sensory derangements and nutrient disturbances encourage anæmia, starvation, and nerve debility. All such cases suffer from the degrees of paralysis, vasomotor, sensory, and functional. Subacute inflammations with congestions and irritations are also common. The heart's action is disturbed, and the organ is damaged both functionally and structurally. The liver is enlarged with interstitial growths and fibrinous deposits. Neuritis of the lower extremities is very common. There are always present in these cases

congestions and defective eliminations of waste matter, also chemical and physiological changes due in part to the action of alcohol and the result of ptomaines and bacterial growths.

The first general treatment is the removal of the apparent cause. This is not infrequently alcohol, although many other sources of irritation and faults in the organism and surroundings are active causes. Breaking up the craze for alcohol is not curative when the causes are more remote. To produce disgust for alcohol in this way and destroy the desire for it is not always a wise measure, although among the quacks this seems to be the central purpose of all treatment. If the patient is a periodical drinker, this craze for spirits can be overcome by a variety of measures. Strong infusions of cinchona or quassia given in large doses every hour will soon be followed by a willing abstinence. The method of provoking emesis by apomorphine, tartrate of antimony, or ipecac may sometimes be very valuable, but usually the apomorphine, antimony, or other drugs of this class are more or less dangerous, and, while they will stop the desire for drink, are followed by conditions of depression and exhaustion that are often serious. The quack method of provoking emesis and giving these persons alcohol following it with the dominant idea that spirits are poisonous is not always safe. If the patient persists in the gradual reduction of the amount of spirits and believes that the sudden withdrawal will be attended with great danger, his feelings should be regarded and acted upon, only insisting that every dose of spirits should be followed by a dose of infusion of quassia or cinchona. Very soon a profound disgust for alcohol and sudden willing abstinence will follow.

Often at the beginning a strong cathartic and hot bath will destroy all thirst for alcohol. The first general treatment should be prolonged hot-air or hot-water baths, with profound elimination through the skin, accompanied by vigorous rubbing. This should be continued every day until profound relaxation of all the excretory organs follows. An electric light bath, in which the patient sweats by light as well as by heat, is one of the most powerful eliminatives we possess. Perspiration is produced in a very few moments, accompanied by general relaxation and not unfrequently by active catharsis and diuresis.

After the alcohol is removed and the spirit craze dies out, nitrate

of strychnine is an excellent remedy. Its more immediate effect can be obtained by the needle under the skin than by the stomach, but the latter method is preferable. The use of this drug should depend largely upon the conditions present. In some cases it may at the start be given in full doses,—one-twentieth of a grain three or four times a day,—and in the course of a week this amount may be diminished. After two or three weeks *nux vomica* should be substituted for it. This can be used a few weeks longer, then should be dropped a short time and afterwards taken up again. Attention should be paid to the bowels during this period, and mild catharsis from salines every two or three days will assist greatly. Hot-air and hot-water baths are necessary every day to increase assimilation and diminish the products of decomposition. Often profuse sweating and rubbing and saline drinks are almost specific remedies. These are general measures which are required in all cases, particularly at the beginning of the treatment.

If the patient belongs to the paroxysmal class and is in a comatose state, hot applications of water and hot baths are the first indications. Oftentimes a shower-bath in which hot water and cold water are used alternately is a most effectual stimulant to break up the coma. Narcotics, particularly chloral and opium, are uncertain and dangerous at this stage. The coma will disappear in a short time if the patient is left on his back in a room filled with good air. On a subsidence of the coma, carbonated waters or seditiz powders should be given. Often a dose of calomel has particular antiseptic and stimulative qualities. Hot water is also very valuable at this time, particularly if there be irritability of the stomach. If the patient insists on having spirits, a small dose should be allowed with quassia or bitter tonics. A preparation called quassine, containing a small quantity of apomorphine combined with quassia, is very useful. The amount of apomorphine is not large enough to produce emesis, but is sufficient to produce some sedative action on the sensory nerve-centres. Carbonated waters are usually very grateful at this time, and in their absence a drink of bitartrate of potassium mixture will be acceptable. An acid is often craved. Hydrochloric or phosphoric acid, well diluted, may be given.

When the drink paroxysm and the acute symptoms subside, *nux vomica* is very useful. For the exhaustion, if the stomach will bear them, various concentrated foods may be taken at short in-

tervals, particularly milk and malt compounds. The patient should remain in bed and bathe twice a day, and have massage if there are any neuralgic states present. When the paroxysm dies out, an iron and arsenic tonic can be used to restore vigor. For the insomnia which frequently follows, hot baths before going to bed, with valerian, hyoscyamus, or lupulin, and other mild narcotics of this class, are often sufficient. Some of the coal-tar analgesics are also valuable. Care should be taken not to prescribe any of these remedies long.

The paroxysmal cases often have distinct periodical returns of the drink storms, and these should be studied and anticipated. Many of them are preceded by distinct premonitory symptoms: one man will become very irritable and fault-finding before using spirits; another will be parsimonious and have delusions of fear that he will be impoverished; another will have delusions of benevolence and generosity; a third will have periods of great physical and mental activity. These mental conditions presage the coming storm, and, when recognized, can be treated medically with great success. In one instance a man who becomes very melancholic for several days before these drink storms come on is treated by the family physician, and the drink storm is averted. The patient is unconscious of the meaning of these emotional changes, but, having great faith in the physician, he follows his directions implicitly. In another case a lawyer has a mania for work and indisposition to sleep or rest for several days before he drinks. His family physician is able to break this up by Turkish baths and large doses of lupulin at night. In this way several drink paroxysms have been averted. Intimate friends of patients recognize the emotional changes which are precursors of the storm that is coming. Many patients also realize this, and learn after a time to make personal efforts to divert these attacks. A prominent lawyer has insomnia, also distressing dreams, several days before he drinks. For many years he has been able to keep sober by taking very active measures to change and divert his nerve energies at such times.

Sexual excess is another premonitory symptom; so is nutrient excess. As an illustration of the latter, a leading New York editor would leave his office in the early evening and eat inordinately, a few hours later would again eat heartily, and soon afterwards would drink to great excess. He never seemed conscious that this

abnormal appetite was a premonitory symptom. At all other times he was abstemious in his diet.

Migraine and sensory changes in the surface of the body precede the drink storm. So also do extreme hyperæsthesia to cold. The patient will suddenly go into a saloon and drink hot fluids to overcome this condition, and this will be followed by a drink paroxysm.

These premonitory symptoms are very numerous, and when studied are found to be significant of the physical and psychical changes which are going on. Medical treatment at this time will effectually break them up and in many instances completely remove the exciting causes. One gentleman who has been an abstainer for twenty years, whenever he has a severe headache, goes to bed and receives treatment for indigestion from his physician. A day or two afterwards he recovers. These headaches are premonitory symptoms of drink attacks, which he learned to heed. To his friends they are termed "bilious attacks," and perhaps are due to the presence of toxins, but they are intimations of a periodical drink storm.

Profound elimination by both skin and bowels is the leading remedy for all these cases. In this there is removal of toxins and poisons which are often exciting causes. Next to elimination is exercise or rest. One man with these premonitory symptoms is able to break them up by prolonged exercise out of doors, another by rest in bed with nerve quietness. In a certain number of cases narcotics may be used to check the nerve irritation. Where the patient appreciates his own condition, the best results may be expected.

Hypnotism at this time has been effectual. This, of course, is simply the dominance of a new idea which seemed to break up the morbid impulse. Many very curious cases will appear along this line where insignificant remedies have been used to fix a dominant idea that completely broke up the drink impulse. Each case must be carefully studied and its psychosis observed with great exactness. I have found that suggestion, hypnotism, and counsel unsupported by physical remedies and measures are useless. Often a radical change of life and living enables one to carry out the counsel of his friends. Electricity, particularly of the static form, may be a practical remedy.

The physician should not neglect a careful study of these cases, for they come to him in private practice, and should he succeed in averting the drink storm it will enable him to have control over the patient that will very likely result in his final cure. The breaking up of the storm once or twice makes it much easier each time, and finally its intensity will be manifest only in some slight emotional disturbances.

The treatment of the second class of delusional inebriates is more complicated because of the mental element present. They have parietic delusions of great vigor and strength and ability to stop at any time and place. There is an erethetic condition of delusional hope and general optimism. The treatment here will vary. The same poisoned and starved state exists, but it affects the higher brain centres. Elimination by baths and cathartics is essential. Then constitutional remedies are required, such as iron, arsenic, or phosphorus. When there is any suspicion of syphilis, mercury should be added.

In such cases the oncoming of general paralysis is always to be feared. The mental exaltation is very symptomatic of profound brain lesion. As a rule, such patients should be advised to give up business or at least change their occupation and methods of living. The man who is intoxicated frequently, and has delusions that he can stop when he likes and that his dissipated habits are insignificant and in no way impair his vigor, is in a very dangerous condition. At any time most serious brain lesions and disorders may develop. The break-down in his case is both physical and mental; in either case it is profound and far-reaching.

The third class of inebriates, the senile and demented toppers, who daily imbibe small drams, and who seem to be governed by no purpose or plan, drinking or abstaining according to surroundings and conditions, and who when using spirits in excess are stupid and demented, require special treatment. They are equally dangerous, and require the same constitutional remedies, such as iron, phosphorus, and arsenic. The same elimination must be carried on constantly and with military exactness. The poisoning from which they suffer produces depression of all the organism, and is likely to be followed by acute disease and death or by dementia and idiocy.

These patients require a radical change of life and living. The

higher governing centres are broken up, and if there is specific infection the difficulties are increased. Such persons very often become drug takers, and great care should be exercised not to use narcotics, particularly opium, chloral, and remedies of like character. They rarely require drugs of this class, although they sometimes suffer from neuritis, but seem less sensitive to pain than other drinking men.

Patients of this class often call the family physician for some local troubles which they ascribe to malaria or traumatism. In this way the doctor may become very active in the care and control of the case, the patient supposing that he is being treated for some local affection while the physician is addressing his remedies to the general condition. To such persons apomorphine in small doses may be given with the spirit or directly after it, and in this way produce a mental effect which may be instrumental in breaking up the use of alcohol, but the feebleness of the brain will require some substitute which is provided for its mental effect.

These three classes of patients come very often to the family physician for help and require different courses of treatment. The cases are often complicated with other diseases, which appear when the spirits are removed.

Tuberculosis is a common sequel after the withdrawal of alcohol. Demented states follow, and often paresis. Neuritis, often called rheumatism, starts up with great activity, and, after running a certain course, seems to react on the brain, producing profound dementia and death. Organic disease of the kidneys, which apparently has been masked, comes into notice at this time, ending in death. Other organic diseases appear which have been concealed before.

In such cases it is often uncertain how far these diseases have been caused by the use of alcohol or how far alcohol has acted as a mask to conceal them.

Many patients after the removal of alcohol become drug takers. There is a tendency to find relief, real or imaginary, from some drug; hence the danger of using narcotics in the treatment. The various "gold-cures" and "specifics" are particularly dangerous in this direction. They undoubtedly increase the degeneration and toxic states of the system, and the breaking up of the drink craze is insignificant compared with the injury resulting from the use

of unknown drugs. Thus, a large number of persons treated by specifics develop acute diseases, which end fatally. Many of these victims die of pneumonia, heart failure, nephritis, and manias which deepen into melancholy and exhaustion, all evidently due to the distressing action and irritant properties of the drugs used.

While strychnine is very powerful in its action and frequently breaks up the drink craze, it is not a universal specific remedy. When given indiscriminately, its stimulant action may produce an increase of the irritation which it is supposed to allay. Often its use in large doses is followed by more nervousness and tremor and a disposition to break out into drink paroxysms again; in such cases the system is very susceptible to its action. Where it is combined with atropine, cannabis indica, hyoscyamus, and drugs of this class, its effects may be concealed and the injury less prominent.

The bromides are valuable, especially the bromide of sodium, but it should always be given in large doses,—from fifty to one hundred grains or more. This may be repeated several times a day, but should not be continued longer than two days; bromism is to be avoided.

Chloretone is a remedy which has recently come into prominence. So far its effects are very good. As a mild narcotic in some of the states of irritation and insomnia which are associated with these cases, it may be used with great success.

The treatment of the complications and conditions which follow from the use of alcohol should all have reference to the perversions and exhausted conditions.

Hysteria is one of the common sequelæ: periodical drinkers often show stages of this disorder. In such cases exercise in the open air, long periods of rest, both mental and muscular, with absolute uniformity in matters of diet and surroundings, are most essential.

It is often a question what degree of exercise and change will lessen the nervousness and become strengthening or how far a change of occupation may be a helpful remedy. These are questions which the physician must decide.

Within the last few years the presence of influenza has complicated many of these cases and added to them a new source of poison, which not only increases the degeneration but also turns it into different forms of serious diseases. Where there is a history

of malaria and influenza, due regard is to be given to the profound exhaustion which is associated with these affections.

In all cases elimination by baths or by drugs is important, together with the bitter tonics, of which quinine and quassia are the most valuable.

Unfortunately, these cases are rarely placed in institutions until they have become chronic; then, the curable stage, which might have been successfully treated at home by the family physician, has passed. In my experience of twenty-four years I have seldom seen recent cases coming to the asylum for treatment. As a rule, all persons on admission are found to have exhausted every available means of relief at home and to be suffering from perverted and organic changes of both brain and body. As a result, their care in institutions requires a longer time and more exact surroundings and therapeutic methods than would have been used at home in the early stages. While the essential treatment is the same, yet it must be more heroic and associated with restraint and forced rest and many other means which are not found in a private residence.

The treatment of delirium tremens, both incipient and pronounced, is not infrequently called for in the patient's home. Where he is not destructive but has mild delusions and the family can care for him, it is probably well that he should be treated at home.

The old therapy by opium, chloral, cannabis indica, and other narcotic drugs is exceedingly uncertain and more or less dangerous. With the aid of an efficient nurse, who is able to give baths and massage and who is vigilant and alert, the case can be carried over the violent stage without other than the mildest hypnotics, of which hops, valerian, and some of the vegetable narcotics are most common. Sulphate of magnesium, in small doses, is a very excellent remedy. Calomel, given every other day until copious discharges from the liver are secured, is also useful.

The delirium ought not to be suppressed by drugs unless violent and distressing. It is easily controlled by hot baths and profuse sweating.

The routine treatment of overfeeding during this stage is not practical, although conditions of exhaustion are present. Toxæmias are to be dreaded, and should be more guarded against than other conditions. Beef tea and other liquid nutrients should not be given for the first two or three days; acid drinks, either cold or hot, are

more effective. The danger of exhaustion is very slight compared with overfeeding and adding to the toxic states already present. In the collapsed stage infusions are more serviceable and often can be depended upon in sustaining the heart and vital forces

Injections of strychnine may be given after the subsidence of the delirium, but should be in very small doses, and the effects carefully watched. Static electricity is of value in some cases.

After the subsidence of the acute symptoms liquid foods may be given in small quantities at short intervals through the day. Carbonated waters will aid materially in restoring the lost chemical conditions of the system.

Psychical care and watchfulness are very essential at this period. The patient's mind should be treated and no disturbing influence allowed to come in, but the utmost frankness and candor should be used.

The profound anæmia which follows requires long rest in bed and frequent massage. Stimulating foods are to be avoided. In some cases meat diet is injurious, and only fish, eggs, and fowl can be used. In all cases tea and coffee are not helpful.

Milk may be valuable, but this depends upon its digestibility.

Nux vomica and preparations of arsenic are the most satisfactory remedies which have been used up to the present.

Attention should be paid to prevent the patient's mind from dwelling on any particular thing or event. It is peculiarly liable at this time to take on illusions and delusions, which must be diverted and changed.

I cannot state too strongly the danger of trusting to specifics in cases of this kind. All such remedies must of necessity contain drugs which in a large proportion of cases are decidedly injurious. All they can do will be to break up the drink craze temporarily. Beyond that, hypnotic influences may be able to create a dominant idea of cure, which may last for some time.

In the treatment of all these cases tinctures are to be avoided, as they contain a large quantity of alcohol. Nearly all the bitter drugs can be obtained in infusions, and, as they are of limited value and for a brief time, they are easily substituted.

Cocaine is probably one of the most dangerous of all the drugs given in the stage of recovery of such cases. Many of the preparations of kola and coca now sold are fortified by cocaine, and

hence are very attractive and produce deceptive effects. A number of alcoholic cases have become cocaine takers from the use of specific drugs, and this condition is more distressing than the first. Some of the specifics contain morphine or other preparations of opium.

The apomorphine preparations may have some value when given discreetly, but not for their emetic properties, rather as mild narcotics and sedatives. These effects can no doubt be obtained from other drugs with more certainty.

I have frequently been appealed to for advice and prescriptions in regard to young men who insist on using spirits as a tonic for some conditions of exhaustion. The problem is an exceedingly difficult one, and requires an exhaustive study of the conditions and of the mentality and surroundings of the patient. Often it is a question of psycho-therapeutics which will tax the ingenuity of the physician to the utmost.

An eminent physician in New York found in a young man of this class a serious heart lesion, and, by holding up before him the possibility of sudden death, he was able to impress upon him the danger of the use of spirits, and in this way was able to regulate his habits of life and living. This young man is now temperate, and has been well for many years.

Another case of this class occurred in a singularly obstinate man about fifty years of age who was breaking down rapidly from the use of spirits, and who did not recognize his condition, but believed that alcohol was a tonic and food for him. The physician, with the aid of the wife, narcotized him profoundly and then nauseated him with various remedies, keeping him in bed for two or three weeks, and, impressing on his mind the extreme danger of sudden death, succeeded in creating a profound disgust for alcohol and causing him ever afterwards to be an abstainer.

These are, of course, exceptional cases, but they show the value of psycho-therapeutics in this realm. It will be gratifying to know that, notwithstanding the great variety of methods and means used, both empirically and otherwise, the curability of such cases is far greater than one would suppose. A very careful examination was made of the after-history of eleven hundred cases treated at the Binghamton Asylum; ten years after their discharge, sixty-one per cent. were found still sober and temperate. Statistics gathered

from a small number of cases show that from thirty to forty per cent. of all persons who were under treatment for periods of from four to six months were still abstinent after fifteen years. Other statistics confirm these conclusions, and we are now justified in the assertion that at least thirty or thirty-five per cent. of all persons treated never use spirits again. These facts are most encouraging. If this percentage of cases can be restored after becoming practically chronic, treatment in the early stages under the family physician will be much more successful.

Experience shows that a certain number of these persons cannot be treated at home even in the earlier stages, because they cannot have a change of surroundings and methods of living. Yet there are other cases where the most successful treatment can be applied by the family physician at the patient's residence. Where the causes can be recognized and provided against, often their most effectual removal can be secured in the family and home.

There is another phase of this question which gives promise. If quacks and charlatans by means of empiric remedies can break up the drink craze and impress the mind with the dominant idea of cure in a certain number of cases, either large or small, much greater results can be obtained by known remedies applied by scientific intelligence and therapeutic skill.

Another fact suggests even wider possibilities. A certain number of cases, even in the chronic stages, suddenly recover by means of the most extraordinary agents, which had been applied many times before without success, or by agents whose usual effects are entirely insignificant compared with the results obtained from them. In almost every community are persons in whom the drink craze suddenly subsided and ever afterwards they have been total abstainers. This phenomenon is usually explained by giving the credit to the last thing used as a remedy or more commonly by saying that the patient willed to stop. No thought is taken of the fact that he had tried so many times before and failed, but the fact that he succeeded this time is to the mind of many persons evidence of his will power. The true explanation is that some physiological change occurred in his brain and the alcoholic craze died out. The limitation of this craze which has been recognized many times before occurs now.

The central object of treatment, therefore, is to bring on this

physiological change, and, by removing the causes and building up the system, to check the alcoholic desire or hurry it to its natural termination.

Many cases are noted where the drink symptom has subsided and other states of degeneration or forms of morbid impulse, such as drug-taking phobias, manias, and delusions, have followed. There is no doubt that some organic change exists of which these are only manifestations.

There are in every community a large number of persons who are recognized as incurable. They are a menace to all hygienic conditions of healthy life and living. Not far away in the future they will be gathered into institutions and made self-supporting. Such persons need military care and direction. They are incapable of enjoying the freedom of healthy men and women, but could be made to live temperate and fairly normal lives under the direction of others. There is something appalling in the statistics of 1899 of a million persons arrested for drunkenness and crimes growing out of this condition. It is this army of unknown, untreated, diseased degenerates that perils our civilization, our homes, and our home life. They should all be gathered into institutions and made to live normally and work for the best interests of the public. A certain number of them could be restored and go back to healthy life and living. Others could be kept from the injury which results from their contagious example.

While we recognize this possibility and feel that it is one of the certainties in the near future, we are, as physicians, concerned with the recent cases, the cure and prevention of the malady which disables men and women in all parts of the country. This is the new field for medical practice.

The central point which I wish to make in this lecture is that in inebriety and its treatment there is no mystery, but that all of these cases are suffering from physical disorders which can be cured, prevented, and stamped out, and that the relief must come from the practice and teaching of medical men, beginning with the family physician. Even in this stage of the history some of the most successful cases that I have ever seen were first treated by the family physician, then went under the specialist's care for a few months, and were returned to the care of the home practitioner and permanently restored.

There is something startling in the fact that this new, outlying field of medical practice is at our doors, and is practically unoccupied except by charlatans and quacks. Some of the facts with which I conclude may be stated as follows.

First, the inebriate is suffering from both a neurosis and a psychosis, and is curable at some stage or another of his disease. At all events, he can be helped.

Second, the conditions requiring treatment are poisoning, starvation, and exhaustion.

Third, the methods to reach these conditions are included in the following: elimination by the skin, bowels, and kidneys, rest of nerves and brain, and building up.

Fourth, mental and psychical treatment which has for its purpose to rest and divert the mind and break up the conditions which have grown out of the past.

Fifth, a study of the exciting causes with the object of removing them or preventing or diminishing their power and influence.

Sixth, the treatment of the conditions which have grown out of the use of alcohol and drugs so as to restore health and vigor and enable the patient to live along normal lines in the future.

Seventh, this treatment and the therapeutic remedies needed to carry it out will vary with the man and his circumstances.

Neurology

AREAS OF SOFTENING IN BOTH CEREBRAL HEMI-SPHERES.

CLINICAL LECTURE DELIVERED IN THE CLINIC FOR MENTAL DISEASES AT THE GERMAN UNIVERSITY OF PRAGUE, AUSTRIA.

BY PROFESSOR ARNOLD PICK,

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GENTLEMEN,—You have heard and will hear in other clinical lessons a good deal about the treatment of disease. In the present clinic, however, I shall insist especially upon the diagnostic points that enable us to recognize the exact location of a lesion of the central nervous system. More than anywhere else in the body exact local diagnosis is of the greatest importance in the diseases of the central nervous system. I am able to present to you to-day a case that illustrates this fact very clearly.

It must be remembered that, while the spending of time in making a careful localizing diagnosis might seem to be of very little benefit to the patient, it often gives us the very best indications for the treatment of the pathological condition that may be found. The localization of a lesion not infrequently reveals at once what is its probable etiology. We know, for example, that syphilis settles by preference in certain portions of the brain. If, then, we are able to establish the fact that the lesion exists in one of these parts, there is great probability that it is syphilitic in origin.

A second, and to my mind a very special, reason why the practitioner should be able to make as exact a local diagnosis as possible is that on the localization of a brain lesion often depends the prognosis of the case. It is the practitioner's ability to make a correct prognosis that represents for the general public the best criterion of his skill as a physician. It will not need much persua-

sion to convince you that prognosis in disease of the brain depends almost absolutely on cerebral localization. The prognosis, for instance, of a hemorrhagic lesion in the left temporal convolution which causes a passing sensory aphasia is very different from that of a hemorrhage in Broca's region, with the resultant motor aphasia usually permanent in character. The case that I present to-day will show you very clearly what important advances were made in the last twenty-five years of the past century in brain pathology, and especially in localizing diagnosis. The very interest of the subject, even without its great practical importance, would justify our careful study of the case.

The patient is a workman's wife, seventy-two years of age, who was brought to the clinic about a month ago, with a history somewhat as follows. About three months ago, in the midst of an attack of vertigo, but without loss of consciousness, she fell to the ground. After this, according to what we are told by her friends, she was not able to use her right foot as she did before her fall. Since then, too, she has complained almost constantly of headache. Some time after her attack she began to wander in her mind and to fail in her speech. After a time those around her could understand only occasional names in her talk. As these symptoms became more serious, her vision gradually failed until she became totally blind. Further than these scattered and rather indefinite data we have not been able to obtain any history. During the last few weeks, her friends say, the patient has been entirely out of her mind and very often restless.

The two things specially noticeable in the patient when she came into the hospital were her complete blindness and her inability to talk. These symptoms have remained practically unaltered while she has been under observation. Her disturbance of speech is undoubtedly due to word-deafness and paraphasia. These, the blindness and the word-deafness, are the two elements in the symptomatic picture which, because of their correlation, we hope to be able to use as diagnostic starting-points for our further investigation of the case and the basis of our conclusions as to the localization of the lesion.

The first consideration of importance for the diagnosis is the present physical condition of the patient. Owing to the condition of restlessness and absence of intelligence in the patient, this is not

easy to determine. The patient has all the signs of advanced age and looks fully the seventy-two years that her friends give her.

She is totally blind. But apart from this and a certain slowness in reaction to light on the part of the pupils there are no disturbances of the visual apparatus. The eye-grounds are perfectly normal; the *bulbus oculi* is absolutely free in its movements. The hearing can be tested only imperfectly because of her mental condition, but there seems to be no serious disturbance of it. The patient turns regularly in the direction from which her name is called. Paretic disturbance in the region of distribution of the facial nerve cannot be found with any assurance. The patient is completely toothless, and this adds greatly to the difficulty of obtaining any signs of muscular weakness in the facial region. There is undoubtedly, however, some weakness of her right arm. When both arms are raised above her head and then let fall, the right sinks sooner than the left. Her right arm seems distinctly less capable of resisting passive motion.

When the patient is given a biscuit to eat, she takes it regularly with her left hand. If by chance, or deliberately, it be placed in her right hand, she transfers it immediately to the left. The patient's gait is, as might be expected in her blind condition, cautious, slow, and groping. It can be easily noted, however, that she spares the right leg somewhat, as if this were weaker than the other. She supports her weight mostly on the left leg, though the right is not characteristically swung as if it were paralytic. The sensibility can be tested only coarsely by means of pricks of the needle. It is certainly not much disturbed. The knee-jerks are both lively; the right one is distinctly increased.

As regards the patient's speech, two things are noticeable. First, the articulation is undisturbed; second, her talk reveals a severe form of paraphasia, approaching very closely so-called pure jargon-aphasia. It should be noted, besides, that the patient spontaneously, as well as on the slightest stimulation, talks a great deal and very rapidly. What she says consists for the most part of a senseless combination of letters and syllables. Among these there occur occasionally a few genuine words, but they are joined together without regard to the sense. Oftener than at any other time the patient utters a few comprehensible words when she is suffering from some strong emotion. Her speech is most sensible when she is very angry.

Under these circumstances there are often whole phrases that can be understood. They consist for the most part of curses or vile names which she applies to those who stand around.¹

The ability of the patient to understand what is said to her is very limited. She seems to understand only an occasional word here and there. Frequently she understands nothing at all. Sometimes she repeats a word that has been said, but evidently without comprehending its meaning. It is clear, however, that these symptoms are not due to senile dementia. It is true the patient requires help to dress herself; but she can eat without assistance, keeps herself clean, and at times reaches out with her hand to touch those who are sitting near her, and evidently in her senseless jargon is endeavoring to enter into conversation with those who may happen to be with her. A number of experiments have shown that she recognizes things by their feel, by their odor, and by their taste. At least to a great extent tests made of these senses are successful, so that any disturbance of them that is present is only partial. More exact investigation by having her write her perceptions is not possible, because of her very low grade of education.

The most important point that we have for determining the localization of the brain lesion in the present case is the visual disturbance. We have to deal with complete amaurosis. Now, the eye-ground is perfectly normal, without a trace of pathological condition; hence it is evident that the blindness is not due to any lesion of the optic nerve itself or of the optic chiasm. The cause of the blindness, then, must lie in both cerebral hemispheres.

What we have to deal with is a pair of complementary hemianopsias. There exists also an undisturbed reaction to light. The slight slowness of the pupillary reaction to light is evidently the result of the patient's age. The association of amaurosis with undisturbed light reaction shows that the visual disturbance is not the consequence of a lesion in the optic tract, but, according to theories at present generally accepted, the cause must lie somewhere behind the corpora quadrigemina. We are compelled to think, then, of an involvement of the occipital lobes on both sides. The absence

¹ The jargon-aphasia of the patient was illustrated at the clinic, but to give samples of it here would be superfluous, since the Bohemian language in which it was uttered would convey to English readers no ideas beyond Professor Pick's striking description of it.

of exact details in the history of the case, and especially of the manner of beginning, the type and the course of the visual disturbance makes it impossible for us to decide, even with any show of probability, whether we have to do with a cortical or a subcortical lesion,—that is, whether the lesion lies in the cunei of both sides or in the medullary portion of the occipital lobes.

I cannot enter into all of these questions. It may be said, however, that, where we have definite and exact details in the anamnesis, we can decide with greater assurance the proximate localization of the lesion. In the present case, because of defect in the history, it is impossible to say definitely whether the two lesions developed at the same time, or—as seems more probable, even from the scanty information that we can elicit—there was at first in consequence of a single lesion an homonymous lateral hemianopsia. This form of hemianopsia, as not infrequently happens, may have been entirely overlooked by the patient and by her friends. The first objective symptom of visual disturbance might well have come with the development of the second lesion in the other occipital lobe, involving the other side of the visual field. This, of course, would bring on more or less complete amaurosis.

Cases of two-sided lesions, one in each occipital lobe, have been reported in which disturbance of vision occurred and yet total amaurosis did not result. In these cases there was a central portion of the visual field from five to ten degrees in diameter in which vision was still retained. These exceptional cases are explained by the well-known fact that the vertical line of half vision in many cases of homonymous hemianopsia does not pass through the middle point of the visual field, but passes around it at a small distance. When this peculiarity was first noted, neurologists believed that such cases were always due to pure lesions of the cortex, and that the non-inclusion of the centre of the visual field constituted a differential diagnostic criterion between hemianopsia produced by lesions in the cortex and that produced by disease in the medullary portion of the occipital lobes. Further investigation has shown, however, that this distinction is not absolute, and so we are not able to assume its significance as an aid in the differential diagnosis of our present case.

Having decided on the existence of two-sided lesions in the occipital lobe, we look to see if it is not possible to bring the localization of the lesion which causes the disturbance of speech in some

simple relation with the occipital lesions. According to our present knowledge of the localization of the characteristic lesions that cause cortical word-deafness, such as we find in this case, we are justified in concluding that there is some lesion of the first and probably also of the second left temporal convolution. The paraphasia that we saw exemplified in our examination of the patient can rather easily be shown to have a direct connection with the word-deafness.

According to Wernicke's theory, which has been accepted by many neurologists, the acoustic word-centre acts as a sort of regulator for the motor speech-centre, and its disturbance thus leads to paraphasia. Pitres has recently denied the value of Wernicke's theory, but in a discussion like this it must be borne in mind. Other neurological authorities consider that the connection between hearing and speech-centres is due to the fact that speech-impulses find their way to the muscles of expression through the acoustic speech-centre in the temporal lobe, and that it is from disturbance of this centre that the paraphasic interference with speech occurs. We know that this acoustic speech-centre is situated in the posterior part of the first and second temporal convolutions. A disturbance of this area might have been brought about in the present case by an encroachment of the lesion in the left occipital lobe, which in its development we must suppose to have pressed upon the adjacent part of these temporal convolutions.

Before we endeavor to explain the hemiparesis of the right side of the body, a word seems necessary as to the type of disease which may be present in this case. The consideration of this will furnish certain data for the problem we have to solve. We have to do here with a non-progressive pathological condition producing no intracranial pressure symptoms. This is clear, since we find absolutely no sign of any pressure symptoms, such as unbearable headache, or physical signs in the eye-ground; besides, the stationary condition of the symptoms which have been noted seems to exclude all idea of a progressive lesion. It would seem, then, that we have to do with a hemorrhage or an area of softening, either of which might be present at this patient's period of life. Even two-sided hemorrhages coming on at the same time have been reported. Simultaneous areas of softening in the occipital lobes are more probable, especially because of the absence in the history of any hint of an apoplectic incident. If this supposition of softening is correct, we must suppose



FIG. 1.—Areas of softening in the temporal and occipital lobes. Left hemisphere.



FIG. 2.—Areas of softening involving the cuneus and the temporal and occipital lobes. Left hemisphere.

that thrombosis developed in the posterior cerebral arteries of both sides as well as in those branches of the artery of the left fossa Sylvii which supply the temporal convolutions. If we suppose this much, the thrombosis, especially that of the Sylvian artery, might readily have extended itself into those branches which supply the central convolutions with blood. This would explain the right-sided paresis.

In addition to this it is possible, and it has often been noted in the study of the pathology of the lesions of the temporal lobes, that thrombosis in the arteries supplying them frequently extends sub-cortically, and so affects the nucleus lenticularis and the internal capsule as to cause a hemiparetic condition. These are the possibilities in the case, and it is impossible to decide definitely which of them is correct. It is true, we are often able to obtain sufficient data to enable us to differentiate very precisely between cortical and sub-cortical hemiplegia, but in the present case the history is so imperfect that we are not able to make use of recent diagnostic advances in this matter.

Macewen says that when the hemiplegia develops first in the leg, then in the arm, and finally in the region supplied by the facial nerve, the lesion producing the paralysis is situated in the internal capsule. When the course of the development is the opposite of this,—that is, when the face is affected first, then the arm, and then the leg,—the lesion is to be found in the central convolutions,—that is, the ascending parietal or ascending frontal convolution.

In the present case, then, we must content ourselves with a somewhat less precise determination of the lesions, and have only to add that, as the lesion is stationary, the prognosis of the case is, for the present at least, reasonably favorable. The termination of it will come through some complication. The patient's age and her lack of intelligence make proper care of her so difficult that complications probably cannot long be avoided.

NOTES ON THE SAME SUBJECT FIVE MONTHS LATER.

GENTLEMEN,—I can to-day consider with you more fully the subject of two-sided areas of softening in the occipital lobes which we discussed some months ago. The symptoms in our old jargon-aphasic patient remained practically stationary for months after our last clinic, and she died recently of pneumonia. Post-mortem examination of the brain showed in the cortex of the left hemisphere (Fig. 1) an extensive and, judging by the amount of hollow-

ness present, deep area of softening, which affected the whole of the first and second and the larger part of the third temporal convolution and also a considerable portion of the occipital lobe. On the median surface of the same hemisphere (Fig. 2) you see, as on the convex surface, that this area of softening extends as far as the edge of the occipital lobe and involves the whole of the cuneus. Study of the right hemisphere reveals a single sinking-in that is much smaller. On the median surface only the cuneus and the convolution lying just below it are affected, as shown in Fig. 3. When we section the hemisphere, after the method suggested by Pitres, it can be seen that in the left hemisphere the whole of the temporal convolutions and the gray matter of the occipital lobe are involved in the softening. Figs. 4 and 5 represent sections of the hemisphere corresponding to the lines marked 4 and 5 in Fig. 1. Fig. 6 displays a section that corresponds with line 6 in Fig. 1, beyond which this hemisphere seems to be free from areas of softening. It is to be noted especially that neither the internal capsule nor the sub-cortical nor cortical substance of the ascending parietal and ascending frontal convolutions is softened. A section made through the occipital lobe on the right side (see Fig. 7) shows that the cuneus in its cortical as well as its medullary portion is softened down to the ventricle. The rest of the hemisphere is unaffected.

Examination of the spinal cord so far as possible reveals with the Marchi method a light recent degeneration in the lateral and anterior pyramidal tract. By means of the Weigert and carmine staining methods, a secondary degeneration, evidently somewhat older, in the lateral pyramidal tract of both sides of the cord can be demonstrated. This secondary degeneration is more marked, however, on the left than on the right. The pyramidal tracts in the medulla oblongata show a corresponding set of changes.

There remains but little to add with regard to the relations which exist between the pathological lesions demonstrated by the autopsy and the clinical symptoms which we observed and discussed some time ago. We may, I think, sincerely congratulate ourselves on the fact that there is for the most part a thorough agreement between the clinical and pathological conclusions. We could scarcely have expected a better confirmation of our premonitions as to the localization of the lesions, considering the obscurity of the case due to the patient's age and mental condition.



FIG. 3.—The cuneus and the convolutions just below are alone affected. Right hemisphere.



FIG. 4.—Section of hemisphere corresponding with line marked 4 in Fig. 1.



FIG. 5.—Section of hemisphere corresponding with line marked 5 in Fig. 1.



FIG. 6.—Section of hemisphere corresponding with line marked 6 in Fig. 1.



FIG. 7.—Section made through the occipital lobe of the right side.

There is, for instance, perfect accord between our diagnosis of a lesion affecting the acoustic word-centre and its pathological basis in a disturbance of the left temporal convolution. The same accord in ante-mortem and post-mortem diagnosis exists as to the occurrence of two lesions in the occipital lobe, one on each side. The lesions on both sides are so extensive that even the macroscopic examination leaves no doubt that the visual tracts on both sides are destroyed. Besides this it is easy to see in both hemispheres that there is a recognizable destruction of the optic cortical centre.

The autopsy does not throw so much light on the cause of the hemiplegic symptoms. We considered that this might be due to a cortical degeneration in some part of the ascending frontal or ascending parietal convolutions. That this was not the basis of the paresis is at once settled by the autopsy. Where was the original pathological condition which formed the initial point for the development of the secondary degeneration in a pyramidal tract we cannot yet decide. The existence of the secondary degeneration is of itself sufficient to indicate that there was some primary pathological lesion in the pyramidal tract. For more exact information we must wait, however, until the microscopic examination is fully made.

It is possible that the changes in the pyramidal tracts may have no connection with the lesions found in the cerebrum. It is not at all unlikely that the initial lesion in the pyramidal tract was localized somewhat deeper in the central nervous system and might be situated, for instance, in the pons.

In discussing the clinical symptoms we followed an old rule which, though a very good one, is not absolute. According to this rule, it is safe to assume that all symptoms which can be explained by a lesion in the left hemisphere should be considered to be due to one lesion which somehow makes its presence felt over an area of the brain sufficient to cause all the symptoms. In the present case, however, the history is so defective that other possibilities must suggest themselves. The hemiplegic symptoms, for instance, may very likely be due to another and entirely independent lesion of the central nervous system. This lesion may be absolutely distinct, not only in location but also in time, from the later degenerative processes in the brain. The patient might quite probably have suffered from thrombotic condition some years before the occurrence of the thromboses which finally brought her under our care.

HEREDITARY CEREBELLAR ATAXIA; NOCTURNAL EPILEPSY.

CLINICAL LECTURE DELIVERED AT THE COOK COUNTY HOSPITAL.

BY D. R. BROWER, M.D., LL.D.,

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HEREDITARY CEREBELLAR ATAXIA.

THIS interesting case has been referred to us for diagnosis. The patient is a girl, thirteen years of age, who is mentally deficient for her age. She is unable to tell very much about herself. You see that she cannot walk except with difficulty, for which reason she has not attended school. She cannot read or write. Her birth was not attended by any great difficulty, for we are told that forceps were not used and there was no trauma. She is remarkably well nourished; she has plump, rosy cheeks, and is a healthy-looking child. As you look at her carefully, you see that she has a peculiar expression of the eyes, which are always in motion. Her pupils respond sluggishly to light; they respond to a bright light. She has no Argyll-Robertson pupil, but, as just remarked, she has constant movement of the eyeballs, and these paroxysms are called nystagmus. Examination of her chest, lungs, heart, and abdomen is negative. There is at times an athetoid movement in the upper extremity. The movement of the hand in grasping an object is not normal; she holds things in a peculiar way, and if you watch the right hand carefully you will observe this movement.

Let us ascertain the condition of the lower extremities. I find that she has a very lively or exaggerated patellar tendon reflex on the left side, also on the right. She has an active foot reflex on the right side. As you watch the toes, you see considerable hyperextension of the big toe. It is a little difficult to separate the voluntary from the athetoid movements. With the constant movement of the toes it is hard to determine the existence of the Babinski sign

in this case, but we have concluded that it is probably present. The Achilles reflex is quite lively. All the reflexes in the lower extremities are exaggerated. In the recumbent posture she moves her limbs with very little incoördination. By pressing down upon a limb while she is trying to raise it, I find that she has a great deal of muscular power. I ask her to walk on the floor, and as she does so you notice lack of coördination. The ataxia is peculiar. It is not the ordinary ataxia of tabes dorsalis. It is almost impossible for her to maintain her equilibrium as she stands with her feet close together. When she shuts her eyes there is very little increase in the ataxia.

She has a perfect appreciation of heat and cold and of tactile sense and pain sense all over the body. The striking clinical feature in this case is the ataxia. I regret that the record does not give her family history. From her we learn that she is the sole survivor of a family of six. Whatever her disease is, it has been present since birth; she has never been able to use her limbs and walk as other children do. It is undoubtedly a case of hereditary ataxia. In looking at this patient there is something about her limbs which suggests pseudomuscular hypertrophy. The muscles feel hard, and the color of the limbs is of a reddish hue, which cases of pseudomuscular hypertrophy often present. But the muscular tissue here is not fat. She has power enough in the muscles if she could use them. There is something that interferes with the power of coördination. This case belongs to the family type of ataxias that were first demonstrated by Friedreich. A few years ago we would have simply dismissed this case as one of Friedreich's ataxia; but Marie found family ataxias that presented the condition of the reflexes and the peculiar type of ataxia that we have here,—that is, an ataxia which is not particularly manifested when the child assumes the recumbent posture, but which is increased when the child closes her eyes. Marie in his cases found as a pathological condition either atrophy of the entire cerebellum or atrophy of the cell bodies therein; that it was a disorder of the cerebellum, and not of the spinal cord; that the disturbance was in the cell envelope. This is undoubtedly a case of the Marie type of ataxia, which differs from Friedreich's ataxic type in that the reflexes are exaggerated. In the ordinary form of Friedreich's spinal ataxia the reflexes are not exaggerated, but lost. There is a third type of family ataxia,—

ataxic paraplegia, from which we must differentiate this case. How shall we do it? We differentiate it from Friedreich's spinal ataxia by the condition of the reflexes, and from ataxic paraplegia by the fact that there is no muscular rigidity. As the limbs of the patient do not show that intense muscular rigidity which belongs to ataxic paraplegia, I take it that this is a case of Marie's hereditary cerebellar ataxia. The affection is due to some congenital defect either in development or in original construction. In this case the cerebellum is not properly developed. There is want of development in the neurons involved in cases of ataxic paraplegia, Friedreich's disease, and the cerebellar type of ataxias. The disease is very rare.

NOCTURNAL EPILEPSY.

This girl is twelve years old. She has had fits at intervals of about a month since she was four years of age. They always come on at night. She has bitten her tongue several times. During the last two weeks, we are told, the attacks have occurred nightly, and some nights she has had two or three attacks. She says that at times her right leg stiffens, or it may be the leg and the arm on the right side are involved. There is no history of trauma except an indefinite fall in childhood, shortly after which the convulsions began. Her appetite has been good up to this time; her bowels have been a little irregular. She had measles at about the time the epileptic attacks came on.

In cases of epilepsy always look for stigmata of degeneration. We find the Darwinian tubercle on both the right and left ears. Her facial expression is peculiar. As a rule, the pupils in these cases are dilated. Notice the peculiar construction of her upper jaw, also the hypertrophy of its alveolar processes. Observe the high, narrow arch in the mouth. Very frequently we find that the fingers are not developed on normal lines. The arms are usually long. I regret that we know nothing whatever about this child's family history. I want the members of the class to look for the white lines which are said to indicate alcoholic ancestry. Many of these cases have either an alcoholic or a neurotic ancestry. It is unusual for epilepsy to develop in a child, except from some severe trauma, without a very considerable amount of neurotic inheritance.

With few exceptions, epileptics are best treated away from their homes. They need a carefully regulated diet as much as they do

anything. They need hygienic treatment, and it is a most fortunate thing for them that we are having established in various parts of the country, little by little, homes or hospitals for their special treatment. The greatest and really the pioneer institution is in New York State at Sonyea, of which Dr. Spratling is the superintendent, and we are getting ready to establish such an institution in Illinois. The preliminary appropriations have been made for it. Ohio has such an institution. There are one or two in the State of Missouri, two in Pennsylvania, and one or two in Massachusetts.

The drugs which are of the greatest service in these cases are the bromides, of which I prefer the bromide of sodium. Though the bromides have been a great boon to epileptics, there is no doubt that they have done incalculable injury to many. They are destructive to the higher cerebral centres, and mental imbecility has followed the immoderate use of them; so it behooves you to be cautious in their administration. Do not push them too far. It may be well to induce a condition of bromism in a case like this for a short time, but do not maintain it long. In giving bromides to these children it is my rule to order one grain for each year of age. Some prefer a mixture of the bromides of potassium, sodium, and ammonium. Brown-Séquard, who did a great deal for epileptics, taught us the use of the bromides and tonics and the necessity of paying attention to the great chylopoietic viscera. He used a mixture of the bromides.

I call your attention to the defective circulation in this child's hands; they are cold. Very many of these epileptics have imperfect vasomotor tonus. The pulse in this case is easily compressible and rapid.

Bromide of sodium is a depressant of the circulation; hence I very rarely give a dose of it without combining therewith some cardiac stimulant. You may give digitalis or strophanthus. You may prescribe any one of a number of cardiac stimulants, but I am quite sure that, as a general rule, the best is the *adonis vernalis*. *Tinctura adonis vernalis* will counteract the depressing influence of the bromides on the circulation. Experiments have established the fact that this drug has anæsthetic properties: it diminishes the supersensitiveness present in these cases. In giving the bromides the best menstruum is some one of the aromatic waters, the choice of which I usually leave to the patient. We will take it for granted

that this child prefers cinnamon-water. So we will give her an eight-ounce mixture to start with. We may prescribe at first ten grains of the bromide; she can take three minims of tinctura adonis vernalis at a dose (ten minims is the adult dose). If you give the bromides with considerable water, there is less acne following and you get better results. The time to give the bromides is after meals, as then they do not interfere with the appetite so much.

The next important thing to look after is elimination. In the great majority of cases you will find an overloaded or impacted colon. This child has considerable flatus, but whether or not she has an impacted colon I am unable to say. An impacted colon requires colonic flushings. These patients require laxatives. Even though the bowels move daily, I would order that a mild laxative, such as a preparation of cascara, be taken once or twice a week. In adults I frequently prescribe compound cathartic pills once or twice a week where the bowels are evacuated daily. I add to the treatment in these cases some intestinal antiseptic. Haig, of London, a distinguished physician, seems to have demonstrated that a good many cases of epilepsy are due to uricacidæmia. Uricacidæmia requires the use of a salicylate, and a very good one to give is salol. If after a week or ten days of this treatment by the bromides there is no effect on the convulsive seizures, I would add to the salol some one of the coal-tar analgesics,—*e.g.*, acetanilid. A child of this age may take three-quarters of a grain of acetanilid three times a day, with safety and possibly with great benefit. Sometimes I still further energize the antispasmodic effect of the capsule which I order in these cases by adding to it some extract of hyoscyamus. This girl may have a grain of salol, one-half grain of acetanilid, and one-quarter grain of extract of hyoscyamus, to be taken with half a teacup or more of hot water, before each meal. Her headache can be relieved by counterirritation. Years ago I used a seton of silver wire at the back of the neck. Although this treatment has gone out of date, it is a good thing. In some of these cases with headaches I apply the Paquelin cautery to the neck. Counterirritation of the neck is one of the best remedies for the headaches of epilepsy; it helps to ward off the attacks; the constant galvanic current also will help to cut them off.

Dr. Spratling, of Sonyea, who has made a special study of

epilepsy, in a recent communication endorses a drug which I used fifteen years ago and abandoned. Since his report was published, I have come to believe that he is right, and that I made a mistake in giving up the remedy,—namely, the fluid extract of *solanum carolinense*. It may be added to the prescription of bromides and *adonis vernalis* already mentioned. Dr. Spratling has found that by combining it with the bromides the dose of these can be diminished and the untoward effects of bromism avoided. This child may take ten minims, and if the first prescription has no effect in diminishing the attacks, I would increase it, as I have done in a good many cases since Spratling's report was made.

THE LOCALIZATION OF NERVOUS LESIONS.

CLINICAL LECTURE DELIVERED AT THE POLYCLINIC HOSPITAL AND SCHOOL FOR GRADUATES IN MEDICINE.

BY ALFRED WIENER, M.D.,

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THE DIFFERENTIAL DIAGNOSIS OF CENTRAL AND PERIPHERAL NERVOUS LESIONS.

GENTLEMEN,—One of the most difficult problems for the practitioner of medicine who is not very familiar with nervous diseases is the assured diagnosis whether a lesion of the nervous system in any given case is central or peripheral in location. I propose to illustrate this difficulty by some chance cases that have come to the clinic to-day, and to give you the data on which the differential diagnosis of central and peripheral nervous lesions is based.

CASE I.—Our first patient is a man forty-two years of age, who came to the clinic several months ago, saying that he had lost the use of his limbs. He seemed to think, and so did his wife, that he was suffering from some form of paralysis. Examination soon showed that, while he had lost the use of his limbs, he had not lost any of the power in his muscles. He cannot walk at all without some support, and then walks with difficulty. His knee-jerks are absent. When he attempts to stand with his eyes closed, there is the familiar Romberg symptom: he sways from side to side and would fall if not supported. His pupils show the Argyll-Robertson symptom. His difficulty in walking is due entirely to incoördination. In a word, he presents a classical picture of tabes dorsalis. In a case like this there is, as a rule, very little difficulty in making the diagnosis of the exact condition present. But if the symptoms

were less distinct and the case not so far advanced, how would we be able to decide that the lesion in the nervous system is peripheral and not central?

CASE II.—Our next patient is a boy of eighteen who is suffering from paralysis of the muscles on one side of his face. He is able to close both eyes now, though he could not do it some time ago. His left eye, however, can be opened very easily, while the orbicularis muscle holds the other eye tightly shut against any effort to open it. There is a history of paralysis of the muscles on the other side of his face some time ago. Since only the two lower branches of the facial are still paralyzed, some doubt may arise whether this is simply a case of Bell's palsy or a central lesion. Therefore, how shall we decide in this case whether the lesion of the nervous system is a peripheral or a central one?

CASE III.—Our third patient is a girl of seventeen who is suffering from paralysis of her hands. About a year ago she lost power in her hands, the right one being affected first and most severely. Since then, as a result either of inactivity or of some trophic disturbance, the muscles of her hands have wasted, and now there is the characteristic appearance of a claw-shaped hand. Her grasp has become very weak, and the condition continues to grow worse as time passes. We have studied her case and have found the distinctive symptom of a special nervous condition. There is almost complete absence of the pain sense. She has only partial anæsthesia, however, for she still possesses the sensation of touch. Her temperature sense is also altered: she has lost the power to distinguish very cold things and likewise fails to be affected by very hot ones. We recognize in this patient a case of syringomyelia, a disease in which there exists an abnormal cavity in the substance of the cord, obliterating in the course of its development the fibres lying close around the central canal,—those which convey sensations of temperature and pain. Again I ask the question, how are we able in this case to decide whether the lesion that exists is peripheral or central?

The answer to this question, as to whether the lesion is centrally or peripherally located, is not very difficult if we remember certain points, upon which I wish especially to dwell to-day. The following table presents the facts necessary for such a differential diagnosis.

When the lesion is in the central part of the motor tract, producing central palsies :

1. Palsy is an extensive one.
2. Palsy is not attended by atrophy of muscles.
3. There is no alteration in the electrical irritability of nerves or muscles.
4. The deep reflexes are present and, as a rule, very much exaggerated.
5. Muscles show an increased tonus or spasticity.

When the lesion is in the peripheral portion of the motor tract, producing peripheral palsies :

1. Palsy is confined to an individual muscle or to a few muscles.
2. Marked and rapid atrophy takes place.
3. Marked electrical changes occur, showing the reaction of degeneration.
4. The deep reflexes are diminished or absent.
5. Muscles are lax and limp, as when passive motion is made.

Explanations of the various points in this table fill up the details of information necessary for the diagnosis of the location of a nervous lesion.

1. Why should palsies due to a central lesion be diffuse in their distribution, while those due to a peripheral lesion are selective, involving only a single muscle or a few muscles? The fibres which compose the various bundles of nerves to be distributed respectively to the face and the leg lie close together in the central portion of the motor tract. Only a very small lesion is necessary, therefore, to involve one or more of these bundles, producing at once a paralysis of one or more extremities. In lesions of the peripheral portion of the motor tract we are dealing with the individual fibres which compose the various bundles above mentioned. It would take a very extensive lesion at the periphery to produce a paralysis of both an upper and a lower extremity or even of the whole of one extremity. When, therefore, you find only one muscle or only the muscles which are supplied by one nerve or the muscles which naturally functionate together paralyzed, the lesion can safely be located in the peripheral portion of the motor tract.

2. Why should atrophy be present in peripheral and not in central palsies? This difference is due to the fact that the nuclear origin of the motor, cranial, and spinal nerves exerts, besides its other function, a trophic influence upon the muscles which are supplied by these nerves. As lesions in the central portions of the motor tract do not interfere with this trophic centre, they have no effect upon the nutrition of the paralyzed muscles, which, therefore,

remain in the normal condition, though, from lack of exercise, they may become smaller.

3. An electrical examination is of very great assistance in the differential diagnosis between central and peripheral palsies. For such an examination a faradic and a galvanic battery are necessary. Testing first with the faradic current, we examine over nerve and muscle, and note the minimum amount of current that is necessary to produce a contraction of the muscle under consideration. We then employ the galvanic current over nerve and muscle in a similar manner. When testing with these currents it is important to note, first, the character of the contraction in the muscle,—whether rapid and prompt or slow and wave-like in its response; second, when testing with the galvanic current, whether the negative pole on closure of the current produces a greater contraction than the positive pole. The normal result would be a rapid and prompt contraction, with cathode (negative pole) closure contraction greater than anode (positive pole) closure contraction. We understand by quantitative disturbances an electrical excitability attained with stronger currents than you would naturally expect to employ. We understand that a qualitative disturbance is present when there is some alteration in the formula above mentioned,—viz., cathode closure contraction is greater than anode closure contraction. Any qualitative or quantitative change in the electrical excitability of a muscle means at once some pathological condition in the peripheral motor system.

4. In regard to the reflexes the following explanation is applicable. For the performance of a reflex act the reflex arc, consisting of the sensory nerve-fibre, the motor ganglion-cell, and the motor nerve-fibre, must be intact. It must allow for the conveyance of an afferent impulse along the sensory nerve-fibre over to the motor ganglion-cell and the reflection outward of this impulse along a motor nerve-fibre (peripheral portion of the motor tract) to the muscle. If any portion of this arc is destroyed by a lesion, naturally such an impulse will never reach the muscle, and all reflex action which shows itself by contraction of the muscle will therefore be unobtainable. If the lesion is a slight one, so that the interruption is only partial, the impulse will reach the muscle, but in a very much weakened state, and the contraction or reflex action will be feeble. All reflex action is controlled by impulses which

reach the reflex arc through the central motor tract. This tract exerts an inhibitory or restraining influence upon the reflex centre located in the anterior gray horn of the spinal cord. If, therefore, a lesion involves the central portion of the motor tract, causing all inhibitory influence to be removed from the ganglion-cell in the anterior gray horn (reflex centre), the deep reflexes will be very much increased.

5. Spasticity is due to an increased muscular tonus and relaxation to a diminished one. It may in some cases happen that the muscle tonus is so very much increased that a marked muscular contraction results. In these cases it is well to be on your guard when testing the deep reflexes; it may be utterly impossible to obtain them unless the contraction is in some way overcome.

DEFINITE LOCALIZATION OF NERVOUS LESIONS.

After the decision of the important question whether a nervous lesion is peripheral or central, the next requirement is a definite differential diagnosis of the segment of the nervous system that the pathological condition occupies. Needless to say, this special localization is much more difficult than the general determination of pathological position. The advances in neurology in recent years, however, have made exact differential diagnosis of nervous lesions not only possible but assured. It needs only the following of certain suggestive indications to locate the part of the central nervous system that is primarily affected.

CENTRAL MOTOR TRACT.

We will consider first the central motor tract. A fact which puzzles most students is that symmetrical parts of the body, such as are always used in conjunction with each other,—viz., the muscles of the eyes, the muscles concerned in speech, the muscles employed in chewing, the abdominal and trunk muscles,—are rarely paralyzed when the lesion lies within one hemisphere. On the other hand, those portions of the body which can be voluntarily exercised and are frequently used alone quickly become paralyzed when such a lesion exists. With the exception of anomalous cases, all lesions located in the motor tract above the decussation in the medulla will produce palsies on the opposite side of the body.

LOCATION OF LESION.	RESULTING PARALYSIS.
CORTEX.....	Monoplegia { Facial Brachial (arm) Crural (leg) } Hemiplegia.
	Epilepsy..... Jacksonian type.
	Motor irritation { Ataxia. Chorea. Tremor. Athetosis.
	Anæsthetic disturbances.

A monoplegia is the characteristic paralysis of a cortical lesion. Acute inflammatory lesions or traumatic invasions may produce such an extensive destruction of this area that a hemiplegic paralysis may result. If the upper portion of the motor area is involved, the leg on the opposite side of the body will become palsied. If the lesion occupies the middle third of this area, the arm on the opposite side will be affected; if the lower third is disturbed, then the face and often the tongue on the opposite side become paretic. If the lesion is on the left side of the brain in a right-handed individual, we may expect, in addition to the above symptoms, a motor aphasia. This is due to the close proximity of the facial centre to the motor speech centre. The opposite condition of affairs is found in left-handed individuals. These cortical palsies never seem to result in complete loss of function in the affected member, but are rather of a paretic type. They are often attended by sensory disturbances, the most conspicuous of which is a partial loss of the muscular and the stereognostic sense. A certain amount of cutaneous anæsthesia or even paræsthesia may be present. The epilepsy attending cortical lesions, and known as Jacksonian epilepsy, is a periodic convulsion confined to one or more extremities, and often remains limited to one portion of the body. It is usually unattended by a loss of consciousness. The patient recognizes a distinct aura, and will in the majority of cases be able to describe it. He will tell you that his convulsion always begins with a twitching of one of his fingers or toes, or that some paræsthetic sensation is present in the part affected, etc. The aura, when motor in type, is of the greatest significance in localizing a cortical lesion. For instance, an epileptic convulsion beginning in the hand, quickly involving the entire upper extremity, and then

spreading to the leg and foot on the same side would point positively to a lesion of the hand centre.

LOCATION OF LESION.	RESULTING PARALYSIS.
CENTRUM OVALE.....	{ Monoplegia. Hemiplegia.

Lesions in this locality produce symptoms resembling those due to lesions in the cortex except that epileptic convulsions are conspicuously absent. The farther away the lesion lies from the cortex the less apt are we to meet with recurring epileptic convulsions. Furthermore, the three bundles composing the face, arm, and leg fibres here converge towards a common point,—viz., the internal capsule,—and thus occupy a more limited area. A single lesion is, therefore, apt to produce palsies not of a monoplegic type, but rather of a hemiplegic order.

LOCATION OF LESION.	RESULTING PARALYSIS.
INTERNAL CAPSULE.....	{ Total hemiplegia. Hemiplegia with hemianæsthesia.

If the lesion involves only the motor tract which in this position occupies the anterior two-thirds of the posterior limb of the internal capsule, we shall find the arm, face, and leg on the opposite side of the body paralyzed. In regard to the face, only the two lower branches of the facial nerve are usually involved: the upper branch remains unaffected or is very slightly at fault. Should the lesion be somewhat more extensive, so that the sensory tract just posterior to the motor tract also becomes involved, there will be added to the hemiplegia a hemianæsthesia on the same side. In such cases we often meet with athetosis or choreic and associated movements.

LOCATION OF LESION.	RESULTING PARALYSIS.
CRUS CEREBRI.....	{ Total hemiplegia, with a crossed third-nerve palsy.

A lesion in this locality produces palsy of the arm, leg, and face on the opposite side of the body, in conjunction with a paralysis of all the muscles supplied by the third nerve on the same side as the lesion. This is due to the anatomical fact that at this particular portion of the brain the uncrossed motor tract meets the root fibres of the third nerve. These root fibres represent the crossed third-nerve fibres of the opposite tract.

LOCATION OF LESION.	RESULTING PARALYSIS.
PONS.....	1. Total hemiplegia.
	2. Total hemiplegia, with crossed facial nerve palsy.
	3. Total hemiplegia, with crossed trigeminal or abducens palsy (conjugate deviation).
	4. Hemiplegia (arm and leg), with a crossed facial.
	5. Hemiplegia without facial involvement.

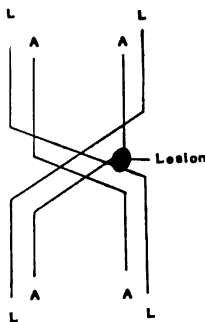
A lesion of the motor tract in the upper portion of the pons will produce a total hemiplegia on the opposite side of the body. It is to be noted in this hemiplegia that all three branches of the facial nerve are involved (compare with hemiplegia of the internal capsule). If the lesion extends across the median line, there will be added to the above total hemiplegia a crossed facial palsy,—*i.e.*, the face will be paralyzed on both sides, together with the arm and leg on the side of the body opposite to that of the lesion. A lesion of the motor tract in the pons just above the facial nucleus will cause a hemiplegia on the opposite side of the body without any facial involvement. This is due to the fact that the facial nerve fibres leave the motor tract a short distance above the facial nucleus and cross the median line, to terminate at the facial nucleus of the opposite side. Thus it follows the law which seems to govern all motor nerve-fibres,—*viz.*, to decussate with their opposite fellow before terminating in the nuclear origin of their peripheral extension. A lesion of the motor tract in the lower portion of the pons or at the nuclear origin of the facial nerve will cause a paralysis of the arm and leg on the side opposite to that of the lesion and of the face on the same side as that of the lesion. This facial palsy has all the characteristics of a peripheral palsy. It may happen that the fifth or sixth nerves are included in the lesion which involves the motor tract in the pons. If this is the case, there will be present a hemiplegia with a crossed fifth or sixth nerve palsy.

Anarthria, or slight difficulty in articulation, is not uncommon in lesions which produce total hemiplegia and crossed facial palsy. This is due to the fact that the hypoglossal nerve-fibres lie with the facial nerve-fibres on the inner side of the motor tracts. A lesion which crosses the median line, involving the motor tract on one side and the inner portion of the one on the opposite side, will produce the condition above mentioned. If in addition to the hemiplegia the sixth nerve nucleus is involved, a disturbance of associated action in the muscles of the eyes takes place. The eyes can-

not be directed towards the side where the lesion exists. On the other hand, there is a conjugate deviation of both eyes to the side opposite that of the lesion. This is due to the fact that the internal rectus muscle of one eye always acts in conjunction with the external rectus muscle of the opposite eye. It should be mentioned in connection with this fact that such a lesion as the above will not disturb the act of convergence in both eyes. This test should always be made, so as to establish positively whether or not the third nerve has been involved in this lesion. When the root-fibres of the sixth nerve are involved, a conjugate deviation of the eyes does not take place.

LOCATION OF LESION.	RESULTING PARALYSIS.
MEDULLA OBLONGATA	Hemiplegia..... { Upper extremity. Lower extremity.
	Double hemiplegia.... { Upper extremity. Lower extremity.
	The involvement of the ninth, tenth, eleventh, and twelfth nerve nuclei in various combinations, with and without the above forms of hemiplegia. A double twelfth nerve palsy.
	Hemiplegia cruciata.

In this portion of the brain the motor tracts and the nuclei of origin of the ninth, tenth, eleventh, and twelfth nerves occupy such a limited area that only a very small lesion will affect a number of these structures at once, either on one side or on both. Acute lesions, unless very small, are apt to prove quickly fatal, on account of the involvement of the cardiac and respiratory nuclei. The most common and familiar picture that we meet with as due to a lesion in this region is a chronic affection of the ninth, tenth, eleventh, and twelfth nerve nuclei. This causes a paralysis of the tongue, palate, and larynx. Very often there is a disturbance of the respiratory and cardiac functions. This whole clinical picture is characteristic of the disease known as chronic bulbar palsy,—hemiplegia (upper and lower extremities) on one side, with a paralysis of the tongue



on the opposite side. It is due to a lesion occurring just at the decussation of the motor tracts. The preceding diagram will explain this clearly.

After leaving the decussation of the motor tracts, we have practically entered the spinal cord. In discussing lesions which may involve the central motor tract within the cord, the cranial nerves are no longer to be taken into consideration.

LOCATION OF LESION.

Unilateral lesion of the cord involving the motor tract ABOVE THE FOURTH CERVICAL NERVE.

Unilateral lesion of the cord involving the motor tract in the region BETWEEN THE FOURTH CERVICAL AND SECOND DORSAL NERVES.

Unilateral lesion of the cord involving the motor tract in the region BETWEEN THE SECOND AND TWELFTH DORSAL NERVES.

Unilateral lesion of the cord involving the motor tract BELOW THE TWELFTH DORSAL NERVE.

RESULTING PARALYSIS.

Hemiplegia on the same side as the lesion.

Peripheral palsy of the upper extremity and a central palsy of the lower extremity on the same side as the lesion.

Central palsy of the lower extremity on the same side as the lesion.

Peripheral palsy of the lower extremity on the same side as the lesion.

A bilateral lesion involving the motor tracts would produce on both sides of the body the same set of symptoms as those above mentioned. This would, of course, depend upon the fact that the lesion is symmetrical and located in the segments as above defined. Should there be an involvement of an area greater than that occupied by the motor tract, a varied combination of symptoms might be present. For instance, a unilateral lesion of one-half of the cord would present the characteristic symptoms of a Brown-Séquard paralysis,—a palsy of the motor apparatus on one side of the body and a paralysis of sensation on the opposite side below the point of the lesion. If there is more or less complete involvement of the cord, there will be present, in addition to a spastic paraplegia or diplegia, a para-anæsthesia, with disturbances of the bladder and rectum. According to the location of the lesion in the cord, the clinical picture will present the characteristic symptoms of a cervical, dorsal, or lumbar myelitis.

THE PERIPHERAL MOTOR TRACT.

In this portion of the motor tract it is necessary to distinguish between palsies produced by (1) a primary involvement of the

muscles, (2) a primary involvement of the motor nerves, (3) a primary involvement of the roots of the motor and sensory nerves, and (4) a primary involvement of the nuclear origins of the motor nerves.

(1) When the muscles are primarily involved, there will be absolutely no disturbances of sensation. The paralysis will never be any greater than would be naturally expected from the atrophy which is present. Unlike what occurs with lesions in the anterior gray horn, which may produce almost the same set of symptoms, there are no fibrillary twitchings in the paralyzed muscles. As long as there are any muscular fibres left, the reflexes will be present and the electrical examination will show no decided qualitative changes. In arriving at a diagnosis in these cases the distribution of the paralysis and the general course of the disease are of great assistance. I refer here to the progressive muscular dystrophies whose clinical picture is so characteristic.

(2) When the motor nerves are primarily involved, all the muscles supplied by the nerve are paralyzed. The paralysis is greater than the atrophy. When a combination of paralysis and disturbance of sensation exists, this combination will correspond to the anatomical distribution of the nerve involved.

It may happen that only motor symptoms are present. In these cases, as stated above, all the muscles which are supplied by the diseased nerve will be paralyzed. In many cases it is possible to put one's finger almost upon the exact point where the lesion has affected a particular nerve. This is due to the fact that other nerve-fibres may be present in the same sheath with the affected nerve, and may branch off at various points of its course. Accordingly as the muscles supplied by these foreign nerves are or are not affected we will be able to locate the lesion above or below the exit of these branches from the common sheath. When the combination of paralysis and disturbance of sensation exists under the circumstances above mentioned, when in addition there is tenderness to pressure along the course of the nerve or nerves, and when also as a result of this pressure there are paræsthetic and hyperæsthetic sensations felt in the distribution of the nerve or nerves, it can be said positively that the peripheral nerve is affected.

In the early stages of the affection the paralysis will always be greater than the atrophy.

(3) When the roots are primarily involved, there are present motor irritative symptoms, atrophic paralysis, with the reaction of degeneration; lancinating pains and paræsthetic disturbances; hyperæsthesia of skin and muscle; anæsthesia.

Lancinating or root pains, as they are sometimes called, are characteristic of lesions which are intravertebral but extraspinal in their location and are due to involvement of the sensory nerve-roots. The above array of symptoms is present usually on both sides of the body. In addition it is not uncommon to find marked tenderness to pressure along the spine at the exact point of the lesion. A decided rigidity of the spinal column is not infrequently noticed. Meningitic exudations, tumors, spondylitis, etc., are usually the lesions present. The history of the case and the course of the disease will assist very much in arriving at a diagnosis.

(4) When the nuclear origins of the motor nerves are primarily involved, the individual muscles are paralyzed. Muscles which naturally functionate together are paralyzed. Paralysis is greater than atrophy. Fibrillary twitchings occur.

When the lesion is of a chronic nature, affecting one muscle after the other, and when the groups of muscles thus affected are those which naturally functionate together, we would expect to find the lesion located in the nuclear origin of the motor nerves. Even should this group represent all the muscles which are supplied by one nerve, there would always be a suspicion of nuclear affection *when the muscles become paralyzed individually*. If these paralyzed muscles are carefully watched, fibrillary twitchings will usually be observed. Although these are the characteristic symptoms that would be expected in lesions located in this region, one should not positively locate it in this portion of the motor tract unless the whole picture of the disease points clinically as well as anatomically to this region. Should the lesion or condition, if it exists in the cord, spread from the anterior gray horn over to the posterior gray horn, there will be added to the above symptoms paræsthetic and partial disturbances of sensation, together with trophic changes. The degenerative atrophic paralysis, due to the anterior horn lesion, and the partial disturbance of sensation (thermo-anæsthesia), due to the involvement of the central gray matter and the posterior horn, when compared in regard to their location on the surface of the body, will be found to occupy entirely different areas.

This whole clinical picture, when fully developed, represents the disease known as syringomyelia.

If now we take the principles thus laid down and apply them to the diagnosis of the cases that we saw at the beginning of the hour, we shall find it a comparatively easy matter to decide whether the lesion in each case is central or peripheral and to determine its exact location in the nervous system. In the first case it is evident that the lesion is not a central one, because (1) there is no paralysis, (2) the deep reflexes are absent, and (3) the muscles show no increase of tonus or spasticity. I have already said that there are typical symptoms in this case which indicate that we have to deal with locomotor ataxia. I have merely called your attention to this case on account of the condition of the reflexes. An alcoholic neuritis may produce just the same clinical picture, with certain exceptions which we will consider at some other time.

In the second case we find a paralysis of certain muscles. It is not an extensive one, being confined entirely to the group of muscles on one side of the face. When the faradic current is used, instead of a rapid contraction there is a slow wave-like contraction over the muscles. The application of the galvanic current shows that anodal closure contraction, instead of being greater, is just equal to cathodal closure contraction. This is the incomplete reaction of degeneration, and indicates that the lesion in the nervous system is surely peripheral and not central. In a word, we have here an ordinary case of Bell's palsy. As the complete reaction of degeneration is not present, the prognosis of the case is good.

In the third patient we have, as already stated, a case of syringomyelia. The first glance tells us that the lesion is peripheral and not central. The palsy, you will notice, is confined entirely to the muscles of the hand. Marked atrophy of these muscles has taken place, giving rise to the characteristic claw-hand. Examination with the battery shows that the reaction of degeneration is present. As the paralyzed muscles are those which are naturally associated in their action, the exact location of the lesion is in the gray matter of the spinal cord.

CEREBELLAR DEGENERATION DUE TO INTESTINAL INTOXICATION.¹

CLINICAL LECTURE DELIVERED AT THE MEDICAL DEPARTMENT OF THE UNIVERSITY OF BOLOGNA.

BY AUGUSTO MURRI, M.D.,

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GENTLEMEN,—I wish to-day to direct your attention to a case of cerebellar degeneration due to intestinal intoxication, which is as interesting as it is rare. The doctrine of the autointoxications of gastro-intestinal origin appears to be established on a thoroughly scientific basis, and should at once be applied whenever the symptom-complex does not agree with those ordinarily observed in apparently similar conditions. What marvellous substances cannot be derived from the admixture of albuminoids, hydrocarbons, and fats, variously modified by the secretions of the organism and all those still little-known germs which permanently or accidentally sojourn in the various tracts of the digestive organs! Two compounds, which are chemically identical, may still be in the possession of different physical, physiological, and toxic properties.

The doctrine of intestinal autointoxication is of still greater value to the practitioner from the fact that by it he becomes possessed of an easy means to cure his patient,—i.e., *the intestinal antiseptics of Bouchard*. Chemists are continually furnishing new antiseptics, and thus the theoretical construction is quite in harmony with the practical requirements.

In this connection I will mention two cases in which I was recently called in consultation. The patients were under the care of two of the most renowned physicians of Italy; one of them suffered from infectious cholecystitis and the other from pyelitis. The diagnosis of the first case was verified at the operation, and that of the second by an analysis of the urine. These patients had

¹ Translated and reported by Léon Lebovici, M.D. (Vienna), of Carlsbad.

been suffering for several months from intestinal derangements and feverishness, but as there were no evident symptoms of their true affections, the attending physicians persisted in the diagnosis of enteritis and intestinal intoxication, though the intestinal antiseptics, which had been continued for months, only resulted in rendering the condition of the two patients still worse.

I do not wish to be understood as saying that such a pathological condition as intestinal autointoxication does not exist; but only that in most cases this doctrine is abused, and that its so-called *rationality* is in direct opposition to science, which requires *actual demonstration*, and to practice, which requires *reality*.

The following questions have a direct bearing on the subject. Are the intestinal poisons produced by the normal or by the pathogenic germs? If the former, what are the conditions under which they display such extraordinary effects? If the latter, from whence do they come, why are they pathogenic, and on what bodies do they act? How are they recognized? Are the poisons produced by them alkaloids, diamines, or toxalbumins, and how many of these substances are toxic, how many innocuous? Where are the proofs that such toxins penetrate into the blood circulation and exert their obnoxious influence on the organs? Are they isolated or do they act in association with one another? Are they destroyed or eliminated? Where is the proof that one or more of them cause the given clinical symptoms, or that a diagnostic opinion based on the hypothesis of the action of the toxins can resist experimental evidence?

As you see, gentlemen, the way is long, and the clinical and anatomical foundations of the doctrine yet in their infancy, but science will eventually triumph. That a patient suffering from intestinal derangements may become affected with nervous diseases is certainly not to be doubted; but how much of these troubles is referable to the toxins, how much to the reflex actions, how much to the incomplete regeneration of the tissues? Do the toxins directly affect the nervous elements, or do they act through other organs? Which toxins act on the brain, which on the spinal cord, which on the peripheral nerves, which on the sympathetic?

Cristiani and Alessi, experimenting on animals, have tried to poison them by producing constipation. The result of these experiments, however, is of little use to one who wishes to know

whether and how constipation is obnoxious to man; and, moreover, the fact must be considered that whereas constipation in man may last for some time without bad effects, in the case of the animals under experiment a constipation of two days' duration was sufficient to produce cerebral lesions,—a fact the genesis of which is still unknown.

At the Congress of Wiesbaden, in 1898, Professors Müller, Ewald, Albu, Ageron, and Boas emphasized the importance of the retention of the gastro-intestinal matter. It cannot be denied that long contact of the absorbing surface with the toxic liquids necessarily favors intoxication. But the problem under consideration cannot be solved by emphasizing only the fact of the long sojourn of the gastro-intestinal contents without taking into consideration other conditions. Is it not improbable that the organism should constantly harbor such a great source of infection, while its defence against the poisons should almost exclusively depend upon the rapidity of their elimination? Is it not possible that the absorbing surface of the gastro-intestinal apparatus possesses an elective power by means of which it is able to render inoffensive the bodies which are normally to be found in the cavity of the digestive apparatus? Does it not seem probable that the evil effect attributed to the absorption of intestinal matter depends rather on its quality? But even if the theory of the presence of unusual and easily penetrating poisons prove false, cannot the absorption of the common and obnoxious substances be explained by changes of the absorbing gastro-intestinal surface rather than by a long-continued contact of the contents with the respective organs? How can the appearances attributed to autointoxication be explained in cholera, typhoid fever, dysentery, etc., if the permanent sojourn of the matter in the intestines possess the great importance given to it by experimenters and clinicians? It seems, however, to be of much greater importance to ascertain these two facts,—viz., the condition of the absorbing mucous membranes, and the quality of the substances which are abnormally contained in the intestines. It is then quite natural that experiments which have not considered these two fundamental conditions, though they may furnish a new fact, should not be able to fulfil our requirements. Human pathology demands to know *the relations existing between symptoms observed in certain patients and the entrance into the blood of toxic substances which*

have been produced in the intestines, and any experiment answering this requirement must show which substances are normally and which exceptionally produced, in what manner they are absorbed, where they act, how they are destroyed or eliminated, and what alterations they leave behind.

The history of this case is as follows. The patient, a woman of the name of Violante Veronesi, fifty-nine years old, was admitted into the clinic on April 29, 1899. Her illness dated from the summer. Previously to that date she had invariably enjoyed good health, had never used alcoholic beverages to excess, and her food had always been sufficient, but of bad quality. In August, 1898, she was seized with diarrhœa, this being the first symptom presented by the patient. Her bowels acted four or five times a day, but there was no blood in the stools. This condition lasted for two months, then disappeared, though the patient had not ceased to take the most indigestible food, such as salads, onions, etc. In December the same condition reappeared. At first the patient improved under medical treatment, but this improvement did not last long, and she began to lose flesh and became melancholic.

Towards the end of February she was for the first time seized with severe giddiness. This rapidly disappeared, but left behind a certain degree of mental confusion and diplopia for distant objects. This symptom persisted, but the patient became aware of it only when in a large room,—for instance, the corridor of a hospital. After a few days a second attack of giddiness occurred, on this occasion accompanied by unconsciousness. About this time she was admitted to the Ospedale Maggiore, of Bologna. Here could be noted only diarrhœa, loss of flesh, diplopia, and general weakness. After a week, however, a new symptom supervened. On attempting to get out of bed she suddenly fell on her back; nevertheless, soon after that she tried to walk, but felt irresistibly attracted to the left side to such a degree that she fell down, and in order to reach her bed she had to be supported by the nurses. From that day she was no longer able to walk alone, owing to the increasing weakness of her legs as well as the *compulsory direction towards the left side*.

Successively other symptoms came on. A sensation of heat was felt in her legs, feet, and trunk, with, at intervals, stings in those parts. Her respirations sometimes became more frequent than

normal, without any apparent reason therefor. Her voice lost its ordinary modulation and became hoarse and monotonous; pronunciation of words became slow, and replies to questions less prompt.

At the examination the circulatory and respiratory apparatus are found normal. Over the entire abdomen there is a slight degree of pain on deep pressure and a certain amount of gastric and intestinal distention; no other abnormality can be detected. The tongue is coated with a thin gray layer.

The patient's physiognomy is apathetic. No asymmetry. The contractions of the muscles of the face are feeble. The eyeballs can be moved in all directions save that of convergence. The tongue is trembling and its movements are impaired. No other abnormalities in the face. The patient can sit up in bed without assistance, but in a short time her respiration becomes more frequent, she is seized with shaking movements, becomes agitated, supports herself on her arms, and finally falls, invariably towards the left side and backward. Even when supported, the patient straddles her legs very much and bends her trunk forward.

Movements of both upper and lower extremities show great weakness. Coördination is everywhere normal, except in the case of the left arm, the patient being unable to touch the tip of her nose with the forefinger of her left hand if she keep her eyes closed.

The condition of the reflexes is as follows: conjunctival and pharyngeal, normal; epigastric and abdominal, absent; plantar, prompt; patellar, exaggerated; tendo Achillis, pronounced, with a slight degree of foot-clonus; biceps and triceps muscles, prompt; masseter muscles, weak; periosteum of the tibia and radius, exaggerated; periosteum of the ulna, very evident; direct muscular reflexes, all quite evident; vasomotor, normal; pupillary, normal under the influence of light and skin stimulants.

The pupils are equal and of medium size; the contraction of the sphincter of the iris in accommodation is also normal, as are all the senses, and examinations by means of the ophthalmoscope and electric current give negative results. The patient's memory is somewhat impaired; she is, however, conscious of her condition and is very despondent. Her temperature remains constantly normal; the pulse is weak and easily compressible, the number of the pulsations being about 75, and that of the respirations varying from 16 to 36 in a minute.

Examination of the blood with Fleischl's hæmometer shows seventy-two per cent. of hæmoglobin; number of red blood-corpuscles, 3,224,000, white blood-corpuscles 6,200. Analyses of the urine reveal very pronounced *indicanuria*; specific gravity somewhat increased; urobilin scanty; no trace of biliary pigments, albumin, sugar, acetone, peptone, propeptone, and blood. Examination for phenylphosphoric acid gives a distinct reaction.

A few days before the patient was admitted into the clinic a new symptom—namely, *vomiting*—supervened. These attacks of vomiting occurred irregularly, usually in the morning, sometimes at intervals of a few days and on other occasions every few hours. The matter ejected was, as a rule, small; sometimes, however, it was copious, very liquid, and showed no distinct traces of the food taken some time before. Through it all the appetite continued good.

Vichy water, occasionally opium, benzonaphthol, and frequent doses of bismuth were employed to check the diarrhœa, which had persisted since December, but all without success. There appeared to be no connection between the intestinal discharges and the nervous derangements.

The patient had been under observation for fifty days, during which time no appreciable changes in the nervous disorders could be noted. Every day from three to five attacks of giddiness occurred while the patient was lying quiet in bed. First there was a sensation of fear, and respirations became accelerated, so that one could count 86 in a minute; dimness of vision followed with eyes widely open, and soon afterwards there was a sensation of being thrown violently forward and upward out of bed. On rare occasions it seemed to her as though surrounding objects were moving around her. The attack lasted a little more than a minute, and left the patient in a condition of great despondency. No connection between the vomiting and the giddiness was recognizable. In some of the severe attacks convulsive movements of the articulations and of the head were noted, but in no case was there loss or even dulness of consciousness. Between the attacks of giddiness the patient complained of the usual formications in the articulations and the trunk, particularly in the left side; this disturbance, however, was not constant. The presence of diplopia could no longer be observed, and temporary dimness of vision was only occasionally

complained of. Since her admission into the clinic she has never had headache.

On May 25 chorea-like movements in the fingers and a slight nystagmus were noted for the first time; but even on that occasion repeated examinations of the patient failed to reveal other conditions than those already mentioned. Delirium supervened on May 26, accompanied by tremblings in all the articulations. The diarrhoea had persisted until May 28, and on the morning of the 29th the abdomen was found to be very much swollen. The nurse in attendance stated that this change in the condition of the abdomen had occurred at fifteen minutes of six o'clock in the morning. While defecating the patient did not complain of pain in the abdomen. Percussion of the abdomen elicited a uniform and deep sound, and auscultation revealed nothing. The introduction of a sound into the intestines was followed by the escape of gas and a return of the abdomen to its normal size, but half an hour later it again became swollen. The pulse was now very feeble (pulsations 120, respirations 36) and the heart-sounds extremely weak.

On account of the delirium, hypodermic injections of morphine were administered on the morning of the 28th and the evening of the 29th of May, but the delirium lasted until two o'clock in the afternoon; death supervened one hour later. From the 12th to the 25th of May the patient, in addition to the medication above referred to, was given potassium iodide in moderate doses and was subjected to mercurial frictions.

The post-mortem examination was made on May 30, sixteen hours after death. Nothing abnormal was found in the chest. The stomach, the cæcum, and the ascending and transverse parts of the colon were distended by gas. The gastric mucous membrane was slightly atrophic, while that of the duodenum and the first portion of the jejunum was pale and covered with a little mucus. The mucous membrane of the ileum was pale and thin; the follicles very much swollen. The same conditions were still more pronounced in the first portions of the colon; the solitary follicles were swollen. The mesenteric glands were of a gray color and œdematous. The spleen was slightly enlarged and very friable. The liver was of normal size, but its consistence was diminished. The kidneys were rather small and somewhat hyperæmic, with very

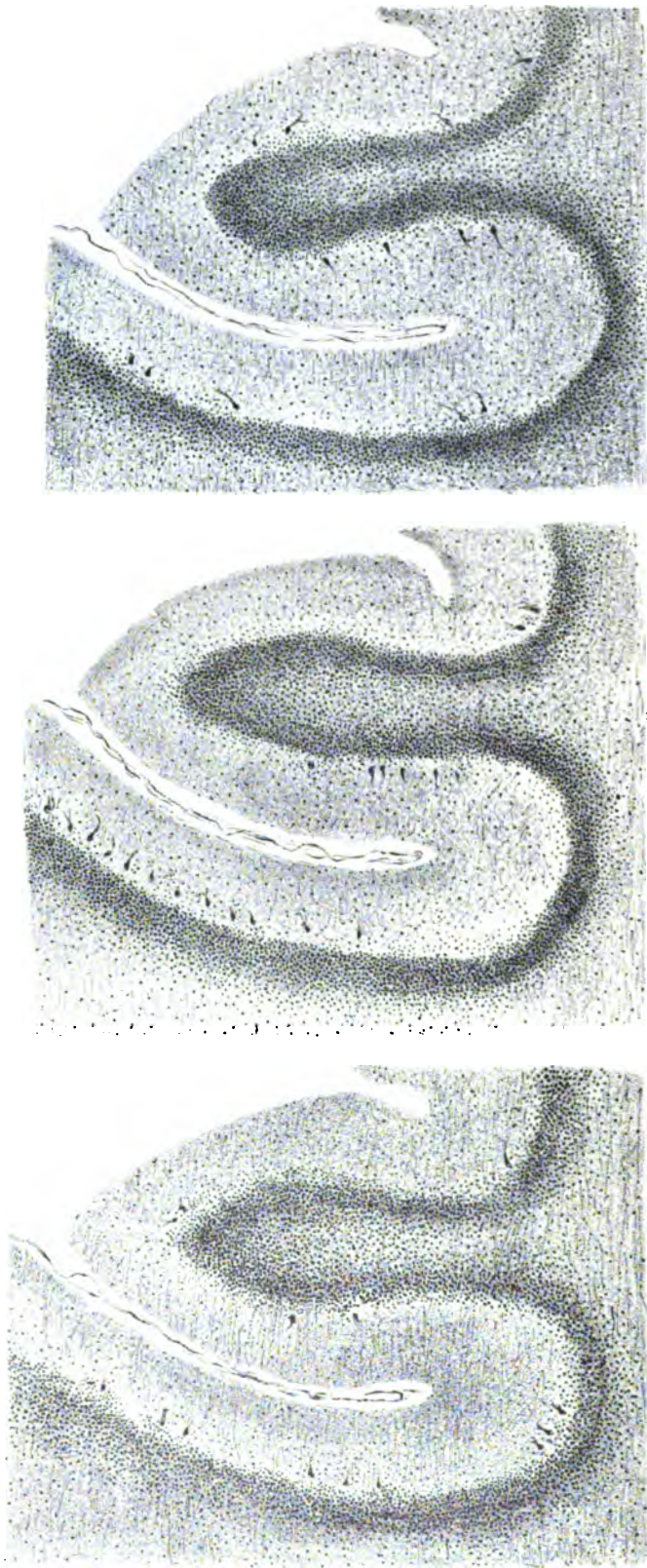
small cysts on their surfaces. The pancreas was of normal size, but of diminished consistency and of a venous color. The genito-urinary organs were normal.

Nervous System.—The nervous substance of the brain was everywhere somewhat soft, but particularly so in the posterior parts in the cerebellum and the thalami.

Spinal Cord.—Histological examinations of the nervous system were carried out by various methods, such as those of Marchi-Vassale, of Pal, of Nissl, of Apátz, and of Golgi. The chief changes of the spinal cord were found in the gray substance. The cells of the various groups of the anterior cornua showed various degrees of dissolution of the chromatic substance; achromatosis was absent, and chromatolysis rarely found complete. The alterations of the nuclei consisted in a certain degree of diffusion of the reticulum and thickening of the nucleolus, while the nucleus was frequently found to lie eccentrically, and in some parts was deformed. The cells of the posterior cornua presented an analogous condition, but the alteration of the nucleus was less frequent. In the protoplasmic substance the initial chromatolysis was wanting; there were also dissolution of the chromatic substance and thickening of the nucleolus in the cells of the column of Clarke.

Medulla Oblongata and Pons Varolii.—Nothing abnormal could be detected in these parts. Alterations were found in the various nuclei which give origin to the nerves at the bottom of the fourth ventricle and in the surrounding parts of the aqueduct of Sylvius, these alterations being of the same character as those noted in the gray substance of the spinal cord. Lateral position of the nucleus and thickening of the nucleolus were much more rarely observed. The cells which take part in the formation of the *bulbar olive* presented considerable dissolution of the chromatic substance, and the lateral position of the nucleolus was very evident and very frequent; these cells were also rich in pigment.

Cortex of the Brain.—Nothing abnormal was found in the meninges and the blood-vessels. The cerebral cells—examined in various parts of the cortex by the method of Nissl—presented a remarkable diminution of the chromatic substance, and the same alteration was noted in many pyramidal cells. The nuclei were in some parts diffusely colored, their nucleoli having disappeared; in other parts they were deformed. The nucleolus, when visible,



FIGS. 1, 2, and 3.—Three successive sections (the deep diameter of each being twenty micromillimetres) of a cerebellar convolution. The diminution in the number of the cells of Purkinje, particularly at the sides and top of the convolution, in all three sections is shown in these figures.

was found enlarged. The large cells of Betz were also affected by the process of chromatolysis, in some of them the chromatic substance having almost completely disappeared; the nuclei were deformed and pushed to the periphery; the reticular appearance was absent and the nucleolus enlarged. The *cerebral pedunculi* presented no alteration.

Cerebellum.—The chief and most striking changes were found in the cerebellum. Microscopical examination was made on sections obtained from small pieces of the cerebellar substance which had been taken from those parts of the cerebellum corresponding to the position of the inferior and superior vermis, as well as from various parts of the cerebellar lobes, the vermis itself, and the nucleus dentatus. When examined under weak magnification, the first alteration which strikes the eye is a great diminution in the number of the cells of Purkinje. These cells do not form, as is normally the case, an uninterrupted series of elements with well-marked and well-colored borders (see Figs. 1, 2, 3, and 4).

The line of demarcation between the molecular and granular strata, which is otherwise drawn by the chain of the cells of Purkinje, is almost indistinguishable in the specimens under consideration. The rarefaction of the cells seems to reach its maximum at the top of the various layers, whereas at the sides of the cerebellar layers the distribution of the elements is more evident and more uniform.

When examined under strong magnification the cells of Purkinje appear a little larger than normal, and the protoplasm of the cells is swollen and granular; the nucleus and nucleolus represent, for the greater part, a single intensely colored body. In some cells only does the nucleolus appear distinct.

In the interior of the protoplasm of many of these cells rather small holes are found, and the processes which leave the cells are more rare and less distinct than under normal conditions. Besides the above, there are great numbers of irregular forms which in shape resemble but slightly the cells of Purkinje, presenting a granular structure and possessing no trace of a nucleus. Some of these forms are surrounded by a few small round elements; in others, which bear a greater resemblance to the cells of Purkinje, the nucleus is hardly distinguishable and has the aspect of a homo-

geneous spot which is diffusely colored and almost invariably eccentrically situated.

The chromatic substance presents the following modifications. While some of the cells are rather well filled with the substance, in others it is divided into very small granules, so that in certain cells it assumes the aspect of a fine powder spread over the cellular body. In still other cells one notes the phenomenon of chromatolysis, either perinuclear or peripheral. The nucleus of the cells is very distinct, of globular form, regular, and possesses an intensely colored nucleolus.

In most of the cells the nucleus is situated in the centre, but not very rarely it is misplaced and pushed to the periphery, and in these cases it often assumes an oval form. In some cells the nucleolus presents a uniform aspect; in many others, however, it is melted together with the nucleus, and the latter then appears in the form of a uniformly colored vesicle. The interjacent masses between the rather well-preserved elements represent *pale heaps of a uniform structure in which one can only rarely note the trace of a nucleus which manifests itself in the form of a more or less central spot* becoming more intensely colored and having no distinct borders. (Fig. 5.)

The cells of the nucleus dentatus are found to be normal everywhere, except that the nucleus of the cells is rarely situated in the centre, but appears almost invariably pushed to the side. The intercerebellar blood-vessels are all filled with well-preserved blood and their walls are entirely free of lesions.

Neither in the granular nor molecular layer, nor in the white cerebellar substance could be discovered, on microscopical examination, any fact pointing to an inflammatory origin of these most pronounced and evident alterations which I have before mentioned when referring to the cerebellum. The cerebellar pia mater did not present any alteration. Using Pal's method, no degeneration, either in the white substance of the cerebellum or in the cerebellar pedunculi, could be discovered. Some cylinder-axes presented a granular aspect, were a little swollen, and had irregular borders. This condition was most pronounced in the cerebellar pedunculi; but to a certain extent was to be found everywhere. A comparison of various parts of the cerebellum leads to the following conclusions. In the nuclei of the tentorium cerebelli there is no diminu-



FIG. 4.—A slightly magnified cerebellar convolution corresponding to a cerebellar sulcus. The diminution in the number of the cells of Purkinje is evident.

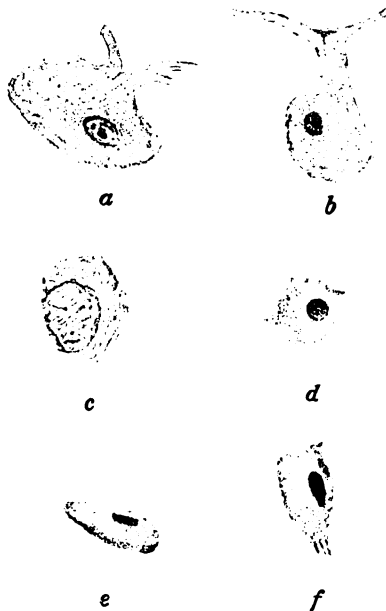


FIG. 5.—The cells of Purkinje in various states of degeneration. *a, b* represent almost total chromatolysis with slight alteration of the nucleus; *c* represents total chromatolysis and disappearance of the nucleus; *d, e, f* represent other stages of cellular atrophy with distinct malformation of the nucleus and disappearance of the nucleolus.

tion in the number of the elements; one only notes pigmentary degeneration in many of them and a lateral position of the nucleus in almost all the nervous elements,—a condition quite analogous to that observed in the bulbar olive. Also the nucleus of Deiters shows no diminution in the number of the elements, but one notes a distinct chromatolysis, particularly around the nucleus, transposition of the nucleus, and enlargement of the nucleolus. There is no difference between the lesions of the vermis and those of the cerebellar hemispheres.

Gentlemen, such alterations of the nervous system as those which I have described seem nowadays to be very common; nevertheless, the pathological process above noted deserves consideration on account of the undoubted causal connection between the intestinal disorders and the nervous derangements. The latter were dependent on the cellular alterations found at the post-mortem examination, and the anatomical lesions fully corresponded to the functional disturbances. The symptoms had, indeed, pointed to the cerebellum as the diseased organ. Considered alone, the giddiness is a symptom of little importance; but when it occurs several times a day during a period of four months, and is of such severity as to cause the patient to fall down, particularly when the condition of the peripheral organs (except the gastro-intestinal tract) fails to show a reason for it,—such a giddiness could not but arouse the suspicion of a cerebellar lesion, which suspicion was confirmed by the impairment of equilibrium, the diplopia, as well as the disappearance of many of the cells of Purkinje (see Figs. 1 to 4). Cellular alterations to a varying degree were also found in the spinal cord and the brain, but in no part, except the cerebellum, did the pathological process reach such a degree as to cause the death of the nervous elements. The other symptoms, such as the universal paresis, the weakness of memory, the paræsthesia, the abnormalities of the reflexes, etc., are probably also connected with these diffuse lesions of the brain and spinal cord, but the most salient symptoms and the most singular phenomena *can be attributed only to the more severe lesion of the cerebellum.*

Thus the perfect correspondence between the functional disturbances and the anatomical lesions, as well as between the latter and the digestive derangements, appears to be fully proved. I am also of opinion that the stomach had little, if anything, to do with the

development of the nervous lesions. The function of the stomach had, indeed, never been very much impaired. It emptied well, the appetite was good, and vomiting occurred only late; moreover, the latter had all the characteristics of nervous vomiting,—viz., it was not preceded by nausea, and the patient's troubles were not relieved by it; the state of emptiness or fulness of the stomach had exerted no influence upon the patient's general condition. The intestinal disorders, however, had for six months preceded not only the vomiting, but also all the nervous derangements. The chronic enteritis had given origin to atrophy of the mucous membrane over large areas of the intestinal tube, and this accounts for the obstinate diarrhœa from which the patient suffered, as well as for the insufficient intestinal action on the albuminoid bodies, that constantly manifested itself by the presence of indicanuria, which, in spite of the diarrhœa, was very intense. I think it probable that the condition of the intestinal mucous membrane had facilitated the absorption of the products of the abnormal digestion. The function of absorption is still the least understood of the intestinal functions, and it is therefore not possible to bring into this clinical review that clearness which is so desirable.

The very fact of the long precedence of the intestinal derangements, renders it almost certain that the products of the intestinal putrefaction had passed into the blood and that the nervous elements had become affected by them, as the latter are invariably first attacked by obnoxious substances circulating in the organism. This view is furthermore supported by the consideration that histological examination failed to reveal any cause for the lesions and the death of the nervous elements in those parts which are in direct connection with them,—viz., the blood-vessels and the glia. The latest medical literature is full of examples illustrative of the fact that primary alteration of the nervous cells or nervous fibres is owing to the influence of toxic substances.

In such conditions as enteritis, degeneration of the nerve-cells, and the complexity of the cerebellar symptoms the practitioner is still unacquainted with the substance or substances which, after having been produced in the intestine, have come into close connection with the nervous elements. This problem will eventually be solved by chemistry, experimental pathology, and more advanced clinical science; but to be able to apply, as in the present case, the

anatomical method to the doctrine of intestinal autointoxications shows a progress not heretofore attained. The clinical fact that symptoms of abnormal innervation (headache, general prostration, vomiting, somnolence, unconsciousness, convulsions, neuralgia, etc.) often become associated with digestive troubles, attracted the attention of physicians to a much greater degree after the theory had been advanced ascribing these abnormalities to the influence of toxic substances produced in the gastro-intestinal tract and brought by the blood into contact with the nervous elements. The theory no longer limited itself to the temporary nervous symptoms of an indigestion, but included even those forms which, up to that time, had been looked upon as the most deeply rooted in the nervous system itself, such as essential epilepsy and many psychical diseases.

As before mentioned, there are still many unknown factors in that argument, and in order to arrive at reliable conclusions one is obliged to take the longest and most modest way of clinical observation, illuminated not only by the uncertain light of poorly known chemical and experimental facts, but by the more certain light of anatomical investigation.

When we arrive at a knowledge of the intestinal affections with which the lesions of the cerebro-spinal system become associated, what parts are most often affected, by what signs the seat and intensity of the lesion of the nervous tissue may be recognized, and what means are best calculated to diminish the intensity of that lesion,—when we know all that (even if the connecting link between the intestinal lesion and that of the nervous system remain unknown), scientific and practical medicine will have made great progress. The case under consideration shows that there exists a primary degeneration of the cerebellum, and that, consequently, the pathology of that organ is not entirely limited to phlogoses, tumors, atrophies, and softenings, as used to be commonly taught. In the second place, observation shows that there are intestinal affections which give origin to very diffuse nervous lesions, but particularly to lesions of the cerebellum. For the present the problem as to whether the effect under consideration depends on a particular character of the substances produced in the intestine rather than on a preceding abnormal condition of unknown character in the cerebellum remains unsolved.

As I had no knowledge of any connection between intestinal derangements and cerebellar lesions, I simply remarked that we had to deal with a cerebellar affection, but I could not affirm that it was due to a degeneration of the cells of Purkinje, and that such degeneration was the effect of intestinal products which had exerted their influence on those cells. Unfortunately, the ignorance of such a possibility was not due to the diagnostician, but to science. In future the physician who diagnoses a cerebellar affection will also have to consider the possibility of a *cerebellar degeneration due to intestinal intoxication*, though such an occurrence undoubtedly belongs to the rare complications of an intestinal affection. When such a condition has been discovered, the diagnosis becomes certain.

Surgery

POINTS IN THE DIAGNOSIS AND SURGERY OF LESIONS OF THE CONUS TERMINALIS AND THE CAUDA EQUINA.

**CLINICAL LECTURE DELIVERED IN THE SURGICAL CLINIC OF THE ROYAL UNIVERSITY
OF ROME.**

BY PROFESSOR DEMETRIUS RONCALI,
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GENTLEMEN,—Falls upon the buttocks or severe injuries in the sacral region are not very uncommon. They are often followed by a train of symptoms which have certain special characteristics to distinguish them from all other forms of injury. These symptoms are due to involvement of the nerve-trunks which come off from the lower portion of the spinal cord,—which, because of its peculiar conformation and similarity of appearance, is called the cauda equina, or horse's tail,—and are also the result of injuries to the terminal portion of the spinal cord proper, the so-called conus terminalis.

Though clinical experience in the last two decades has familiarized us with these injuries and their consequences, the symptomatology and precise localization of the nervous lesions in the cases are not definitely settled. It is not surprising to find a certain indefiniteness of view in this matter among clinicians, since even the terms that describe portions of the nervous system in this region are not positively settled in their signification. For instance, it is still under discussion whether the conus terminalis and the cauda equina should be considered to include part of the lumbosacral plexus, or whether they should be considered to consist

only of the sacral plexus and of that conical portion of the spinal cord which gives rise to the coccygeal nerves.

Leaving aside these theoretic difficulties, much has been settled with regard to our practical knowledge of these cases. About five years ago Professor Raymond declared that the pathology of this part of the spinal cord constituted a chapter in pathological science which might be considered in a certain way as placed between the limits of the pathology of the cord and that of the central nervous system, and that as a consequence it involved problems of the most intricate description as regards their diagnosis and cure, though they are at the same time of the greatest practical interest to the physician as well as to the surgeon.

It is this chapter in pathology that I have the fortunate opportunity of illustrating for you to-day by some cases that have been under the treatment of Professor Durante. They represent the typical conditions that develop when severe injury of the sacral region has led to serious involvement of the terminal portion of the spinal cord.

Our first patient is a young man of twenty-two, a glass-blower, who came to the clinic for the treatment of an affection of the central nervous system. His father and mother are living and in good health. He has a brother who is living and well and at present in the army performing required military service. He has two sisters living, both of them in robust health. He had the ordinary diseases of childhood, and at sixteen suffered from malaria, which lasted only for some eight days, however, and then was cured by the administration of quinine. He denies any syphilitic history. He admits that he has been a rather heavy drinker. Practically he has never had any serious illness except the one for which he now seeks surgical treatment.

The history of his present condition began some four or five years ago, when, one day while drunk and wandering in the park of the Villa Borghese with some companions, he attempted to climb a rather tall pine tree. When he had reached a height of about forty feet from the ground, he was taken with dizziness. He retained sufficient sense and self-control, however, to keep his hold on the trunk of the tree and so slid down, though with rather more rapidity than was consistent with comfort. About ten feet from the ground were some projecting knots, which loosened his grasp

on the trunk and prevented his further lessening the rapidity of his descent; in consequence, he fell directly to the ground, landing upon his buttocks.

It is evident that his fall down the trunk of the tree had been a rapid one, since he immediately lost consciousness and had to be taken to the hospital, where he remained for nearly forty-eight hours in a comatose condition. The hospital surgeon who first came to his assistance considered that it was a case of cerebral and spinal concussion. When the man recovered his senses, he was found to be suffering from anæsthesia from the epigastrium down and his lower limbs were absolutely incapable of movement. Besides he had rather severe pains in the sacral region and the epigastrium. For some days afterwards he suffered from retention of urine and fæces, but after the first week incontinence of both functions set in and has persisted to the present time.

There has never been as a consequence of the fall the slightest symptom of disturbance in either his head or his arms except for the passing unconsciousness of the first two days. In the course of two or three months after the accident the patient noted a marked improvement not only in the pain, but also in the ability to use his lower limbs. The pains seemed to be on the point of disappearing completely, and were noticeable only whenever he was about to sit down, and even then but to a slight degree. His paraplegia improved so much that, in place of a condition in which he could accomplish no movements, he gradually became able to support the weight of his body and to walk around with the aid only of a cane. Beyond this, however, there was no improvement. The patient was not able to work, could walk only to a limited extent, and was practically in a state of chronic invalidism.

He was given electrical treatment at another hospital for some months, but this seemed to do no good. After some time the suspension treatment on alternate days was tried for several weeks. At first there seemed to be some slight improvement, but at the end the patient was not able to notice any lasting benefit derived from this method. He was looked upon as incurable and was transferred to a home for incurables.

He had not been long in the home before the formation of a number of rather deep ulcers was noted. These ulcers were situated on the anterior and external parts of the leg, posteriorly in

the popliteal region, and in the tibiotarsal region near the feet. Ulcerations were also noted in the anterolateral region of the thorax, but these were not so deep or large. The ulcers proved rather obstinate to treatment, but after some four months of almost constant care all of them healed. On healing they left rather extensive spots, usually circular and of rather coppery-brown color, as you will see when we proceed to the examination. His ulcerative lesions healed thoroughly while at this hospital, but no other improvement of the patient's condition took place. He was in the hospital for more than two years, but his condition remained absolutely stationary.

The weakness of his legs continued unchanged. Vesical incontinence remained as a prominent symptom, and his rectal reflex remained as blunt as shortly after his injury. The patient had constantly to wear a urinal, as his urine passed from him absolutely without any consciousness of the fact. He was constipated, being able to evacuate his bowels not oftener than every eight or ten days, and then only after taking a large dose of some purgative. His sexual functions were very much lowered in tone, though they were not completely obliterated. Occasionally for weeks at a time there is no sexual impulse.

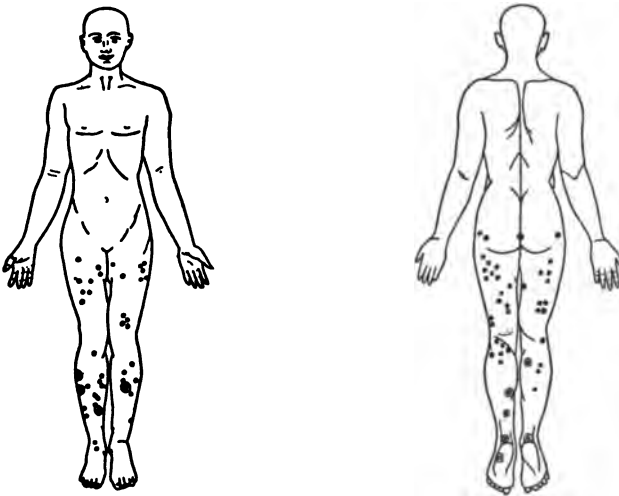
At times the patient suffers rather severe pain in the sacral region and complains of paræsthetic feelings over the soles of his feet. This plantar paræsthesia takes the form of formication and is a source of considerable discomfort. His pains occur only when he moves or just as he is about to sit down; after he has been walking for some time they diminish. While in the sitting position his pain is always localized in the sacral region and never radiates to the legs.

The pains complained of by the patient are always of a boring character. He finds it very difficult to go up or down stairs and is compelled to support himself by clinging firmly to the baluster. A walk of several blocks makes him very tired and he is obliged to sit down. Even a walk around the ward produces some sense of fatigue.

Examination of the patient shows very few external signs of the ailment from which he suffers. His face is perfectly normal; his pupils react normally to light and are equal and of normal size. The movements of his eyes are unlimited, and there is absolutely

no symptom of any general disturbance of the nervous system, such as might be suspected from the character of his pain, the extensive generalization of the ulcerations and the scars they have left, their evidently trophic character, and the involvement of his sphincters.

When the patient is stripped completely, his muscles are found to be reasonably well developed, except for certain groups which we shall describe presently. The most striking thing about his appearance are the brownish, copper-colored spots, the ulcerative scars that we have spoken about before. Some of them have the appearances of true cicatrices. They are larger and more numerous on the right side than on the left. (See Fig. 1.) On the back



FIGS. 1 and 2.—The dark spots represent small ulcerative lesions. The dark spots with circles show larger ulcers, eschars, and gangrenous lesions. (Anterior and posterior views.)

of the legs they exist quite as plentifully as on the front, and here too present similar characteristics to those just described.

While we are looking at the legs and feet a continuous and persistent fibrillary contraction in the muscles of the lower limbs may be noted as present. This is most manifest on the anterior of the thigh and is more evident in the right leg than in the left. Some fibrillary contraction can be seen also in the lower leg and even in the smaller muscles of the foot. There is in the feet a curious condition that can be noted only on close observation: the fibrillary contractions in the little muscles down there have their

line of oscillation in a direction perpendicular to the axis of the body.

It can be seen that the muscles of the right leg are slightly smaller than those of the left. This is especially noticeable in the anterior group of muscles of the thigh. As a result of the weakening of these muscles, the right limb has a tendency to outward rotation. This can be seen particularly in the right foot, which in walking is always set down at a little greater angle to the line of forward movement than the left foot. In the feet themselves the toes, either because of permanent flexion of the flexors or loss of power in the extensors, are bent down upon the sole. This contraction is less noticeable in the big toes than in the smaller ones.

Measurements of the different portions of the lower limbs show that the impression of difference of size in favor of the left leg is confirmed by the tape-line. The difference is very slight, but it exists at all parts of the leg. It is most marked in the distance from the trochanter on each side to the extremity of the coccyx, which on the left side is greater by more than a centimetre. Before his accident the patient was distinctly right-handed, and we should therefore naturally expect the right side of the body to be more fully developed; the difference of a centimetre, then, in favor of the left side means at least twice this amount when we remember what the normal development of the favored right side should be.

When we examine the patient in the prone position, we find the cicatrices of the ulcers very distinct, as in front. There are two specially large cicatrices with pigmented spots the size of a five-lire piece (or a silver dollar). One of these is situated at the point where the sacrum joins the coccyx and the other, only slightly smaller, is in the right gluteal region, precisely over the line of junction of the buttock with the thigh, marking the lower limit of the gluteal muscles. (Fig. 2.) The fibrillary contractions are evident on the back of the leg and are more marked on the right than on the left. The difference in size between the two legs can be very easily noticed from the rear.

When we ask the patient to move his legs, we find that abduction and adduction seem to be absolutely uninterfered with on either side. These movements can be executed evidently with as much power as in health and without any more delay. Movements

of flexion and extension of the leg are, however, much more slow than normal. Movements of the muscles of the feet and of the lower legs are possible, but have lost much in muscular energy.

When the patient walks, we find that he is able to walk a straight line without a cane and without swaying from side to side. It is easy to see, however, that he lifts his legs but very little and that they are carried forward only for a small distance. He walks with the mincing gait of a man who has something interfering with the taking of long steps. It is easy to see that he brings his foot down upon the heel, and that this peculiarity in his gait is not modified by asking him to walk with closed eyes, or to turn from side to side, or even to walk backward. It is, therefore, an essential peculiarity of his case. When the patient is asked to stand with closed eyes, we find slight oscillation of the trunk from side to side, but not in an anterior and posterior direction.

Careful examination of the sacrococcygeal region at the point where three years ago he received the injury does not enable us to locate any alteration in the positions of the bones. Pressure here, unless it is very hard, does not cause any more pain than in normal individuals, for this is a comparatively sensitive spot. Pressure along the vertebral column shows that there is no sensitiveness in the cervical or upper dorsal region, but that below the sixth dorsal vertebra pressure becomes painful. This sensitiveness to pressure is increased at each of the vertebræ on the way down. The lumbar vertebræ are very sensitive to the touch, the fifth lumbar vertebra exquisitely so, and similar sensitiveness exists along the whole of the sacral bone. Pressure in this region the patient compares to the stroke of a hammer. On the other hand, it is rather surprising to find that even heavy pressure upon the coccyx does not produce the slightest sensation of pain. Notwithstanding the fact that the muscles are in a constant fibrillary tremor, they are not sensitive. Pressure upon them in front or rear elicits no complaint of tenderness. Passive movements of the lower limbs can be induced without any discomfort and to a normal extent. There is absolutely no hinderance to movement by contraction of muscles or roughness of joints.

Tactile sensibility is diminished in both the lower limbs. In the thighs there is a narrow region over the adductor muscles in

front and at the inside of the leg and most of the posterior part of the thighs as far as the knee. In this total anæsthesia the skin over the glutei muscles is also involved. The scrotal region is completely insensible to touch. Diminished sensibility exists over the whole penile surface and is very marked. There is also complete anæsthesia of the perineal region, which extends to the anal and urethral mucous membrane. This accounts for the fact, already mentioned, that the patient does not notice the passage of fæces or urine. (See Figs. 3 and 4.)

In the lower leg behind there is a definite area of greatly low-



Fig. 3.—Dotted area shows region of only slight disturbance of sensation. Shading over penis and scrotum and root of penis represents greatly lowered sensibility. Horizontal shading illustrates region of complete anæsthesia.



Fig. 4.—Horizontal shading shows region of complete anæsthesia. Oblique shading illustrates markedly hyperæsthetic region. Dotted area denotes regions with but slight disturbance of sensation.

ered sensibility over the calf muscles. The skin of the leg, foot, and toes has diminished sensibly to touch, though it is not very marked. Sensation is more disturbed on the outer portions of the foot than on the inner surface. The disturbance of the sensation of pain corresponds practically entirely with the diminution of tactile sensation. Sensations of heat and cold correspond in their disturbance with tactile sensation also. We have not the characteristic selective disturbances of sensation which make up the pathognomonic symptoms of an obliterative lesion around the spinal canal.

The reflexes are considerably disturbed. The epigastric and abdominal reflexes are absent entirely. The cremasteric reflexes are, on the contrary, very lively, especially on the right side. The knee-jerks are also lively in both legs, and on both sides in the leg the tendon-reflexes are all somewhat increased. The plantar reflex is totally absent, notwithstanding the fact that ankle-clonus is present on both sides. The sense of position in the lower limbs is perfectly preserved.

The electrical reactions give us some information. In the outer side of the leg anteriorly the muscular contractions either with cathode or anode are a little slower than normal, and the difference between the reactions of cathodal opening and anodal opening is much less noticeable on the left than on the right. With the faradic current we find that in the gluteal regions a current of high intensity is required in order to obtain even slow contractions. The contractions which occur are, however, always more energetic on the left than on the right. In the posterior parts of the thighs, when an electrode is placed over the point of insertion of the flexors of the leg, there are more powerful contractions on the left than on the right. Finally, in the posterior parts of the lower leg, when an electrode is placed on the left calf, a series of diffuse muscular contractions occur, which are not noted when the same experiment is tried on the right side. On the right the only muscle that seems to contract as the result of electrical stimulation in this way is the flexor of the large toe. When the nerve-trunks themselves are reached by the electrical current,—as, for instance, when the electrode is placed over the bifurcation of the great sciatic nerve,—the contractions produced are always more noticeable on the left than on the right. The response when an electrode is placed over the superficial peroneal nerve is always prompt, but even here the contraction is more energetic on the left than on the right.

The radioscope has been employed in order to determine whether there is any abnormality or deformity in the bones of the sacro-coccygeal region. Nothing of any importance was found, however. There is no fracture or dislocation of any of the important bones of the pelvis, and there is only the negative conclusion by exclusion that the difficulty must be within the spinal canal.

In order to ascertain how far the anæsthesia extended in the urethra, a sound was introduced into the canal, but the patient was

not able to notice its presence until its point reached the prostatic urethra, where the anæsthesia seems to stop completely. There is no anæsthesia of the bladder, and with the catheter from forty to fifty cubic centimetres of urine were taken away at each observation. In order to determine how far the anæsthesia of the rectal mucous membrane extended, a medium-sized rectal speculum was introduced, and besides the relaxation of the anal sphincters it was noted that the anæsthesia did not extend beyond seven centimetres from the orifice of the anus.

To resume our observations, then, we have found anæsthesia and hypæsthesia of the posterior part of the legs, of the mucous membrane of the anus, and of the urethra, as well as of the perineal, the scrotal, and the penile regions. We have found paresis of certain groups of muscles, especially of the extensors of the leg, also complete paralysis of the rectum and the urinary bladder. Besides this we have been able to demonstrate the quantitative diminution of the electric reaction, as well for the muscles as for the nerves of the lower limbs, when the faradic current was employed. With the galvanic current we have found a reaction of degeneration in the muscles of the right side and in those of the calf of the same side. On the other hand, this reaction of degeneration is wanting in the left leg, and our electrical observations are confirmed by the fact that the measurement of the circumference of the right leg is distinctly less than that of the left, though normally in a right-handed—or, rather, right-sided—patient the opposite should be true.

The diagnosis of the case is evidently post-traumatic adhesions, probably completely extradural, at the end of the spinal cord. These adhesions are in the neighborhood of the conus terminalis of the cord and involve some of the roots of the nerve of the cauda equina. The reasons for this diagnosis are the locations of the anæsthetic patches together with the hypæsthesia that can be found over practically the whole of the lower limb. It is interesting to note that the area of anæsthesia is practically that upon which the individual usually sits, besides, of course, the perineal, scrotal, and penile anæsthesia. It is only a coincidence, but worth noting because of its significance, that injuries which cause this set of symptoms are usually received from a fall in which the person lands on the buttocks,—that is, in a sitting posture.

There seems to be no contraindication to operation in this case. For two weeks the patient has been in the hospital here and his temperature course has been absolutely normal. The highest temperature recorded was 37.4° C. (about 98.4° F.). The patient is always cheerful and laughs and jokes with his companions; his mental faculties are clear. He is of a rather high grade of intelligence for his social condition, and is very willing and even anxious that the operation should be done. He wants us to proceed with it as soon as possible. He has had a series of purgations during the fortnight in the hospital, and the purgative of preference has been found to be calcined magnesia stirred up with water. The patient says that he has himself always found this purgative most useful. Sulphate of sodium, as a rule, has no effect on him.

SUBSEQUENT CLINICAL NOTES.

About ten days later the operation was performed by Professor Durante, who did a laminectomy in the dorsolumbar region, using Cavicchia's method. The incision extended from the spinous process of the tenth dorsal vertebra to that of the third lumbar vertebra, and was carried down to the supraspinous ligament, which was not cut, however. From here two parallel incisions were made through all the muscles down to the vertebral arches. The spinous processes of the eleventh and twelfth dorsal and of the first and second lumbar vertebræ were thus exposed. The incision through the muscles gave rise to considerable oozing of blood, which was checked by the free use of tampons. After the removal of the arch of the eleventh dorsal vertebra the spinal cord was exposed, and the dura mater was found to be of absolutely normal color, without anything abnormal in its general appearance. When the twelfth dorsal vertebra was removed, however, cicatricial adhesions were found to exist between the bone and the dura. These adhesions were broken up. By the use of a small mirror adhesions were also found to exist between the first lumbar vertebra and the dura beneath it. The mirror could be introduced only half a centimetre, because of the existence of rather solid bridges of cicatricial tissue. The arches of the first and second lumbar vertebræ were then removed, and were found firmly adherent to the dura covering the conus terminalis. The adhesions were carefully excised and the examination was continued along the sides of the cord. Adhesive bands

of cicatricial tissue were found to be stronger and more frequent on the right side than on the left, which accounts for the fact that all the symptoms were more marked in the right leg than in the left. After thorough cleansing of the field of operation and the placing of a gauze drain in the lower angle of the wound in order to favor exit of blood if any should collect, the suture of the parts was begun. The osteoligamentous flap that had been resected was replaced, and the aponeuroses together with portions of the ligament were stitched together on both sides.

After a long surgical course the patient's wound healed completely, but practically no benefit seemed to have been derived from the operation. Examination showed that the incision made by the surgeon had entirely healed and that there had been perfect union of the osteoplastic flap, made according to Cavicchia's method, without any subsequent displacement of the parts. The vertebral column is in its former condition, as far as can be judged, and there is not the slightest abnormal mobility to be noticed.

His symptoms remain absolutely unimproved, however. The anæsthetic patches exist as before and the hypæsthesia of the lower limbs is still present. Paresis of his legs remains as a marked feature, though confined mainly to the extensor group of muscles. He is able to walk around, but not to pursue any laborious avocation. The incontinence of his rectum and that of his urinary bladder are quite as before the operation. His sexual power is now almost completely absent. The case would seem to indicate that, when the lesion in such cases involves the spinal cord itself and is allowed to remain for a considerable length of time, surgery is unable to afford any relief to the symptomatic condition which develops.

SOME ACUTE AFFECTIONS OF THE GALL-BLADDER AND ITS ASSOCIATED DUCTS.¹

BY HOWARD LILIENTHAL, M.D.,

Attending Surgeon to Mt. Sinai Hospital.

ACCURATE diagnosis in abdominal disease has become a possibility as a consequence of the increasingly frequent opportunities for actual examination afforded on the operating table. The dissection of the dead body will, to be sure, demonstrate the principal lesion and its complications after they have progressed as far as Nature will allow, and this method of study in the topic under discussion, as in all the other branches of medicine, is of immense importance and value; but it must be admitted that the surgeon during an operation has the opportunity of seeing the conditions as they exist in the living and before the occurrence of such changes as would make a cure of the disease impossible. And, too, he is enabled to note the effect of the mechanical relief of the conditions upon the progress of the disease. Thus, while a post-mortem examination in a case of appendicitis may demonstrate the anatomical and pathological changes which have been responsible for the fatal termination,—the perforated gangrenous appendix, the abscess, and finally the suppurative general peritonitis,—the surgeon has the advantage of noting how in the majority of instances the removal of the gangrenous organ on the point of rupture cuts short the morbid process and without the abscess and the peritonitis leads directly to recovery. It would be a reproach, indeed, if, with the enormous advantages afforded by almost daily experience, the diagnosis and prognosis in appendicitis had not approached an accuracy which even ten years ago would have seemed marvellous. And this facility of diagnosis is no longer confined to the surgeon, for the general practitioner by frequent contact with this class of cases has also mastered the lesson. The public, too, is rapidly becoming edu-

¹ Read by invitation before the Harlem Medical Association, at the April Meeting, 1901.

cated, so that when one mentions the dread name of the disease an operation is often enough demanded by the patient or his friends, who have learned through the sad experiences of others the great danger of delay.

There is another organ in the right half of the abdomen which is affected by disease in much the same manner as is the appendix, so that not infrequently the one disorder is mistaken for the other. And, indeed, it is not always possible to differentiate accurately between them. Often enough patients with cholecystitis are brought to the operating table with the diagnosis of appendicitis, although the opposite of this error is rare. Cholecystitis is quite as serious an affection as appendicitis, though its course is not often so rapid as the so-called fulminant variety of the latter disease. It is about as likely to be followed by other attacks and is about as unlikely to be permanently cured by anything short of operative measures. Besides, a danger exists here in addition to all those which may occur in appendicitis and quite as serious as any of them. This is cholangitis, or inflammation of the ramifications of the gall-passages within the liver.

The causes of inflammation of the gall-bladder are various; some are understood while others are not. Infection by the pus-producing bacteria, notably the colon bacillus, is probably the commonest, though cholecystitis due to typhoid bacteria is of sufficiently frequent occurrence in the course of the primary disease, or even as a sequel to that malady, to make it worth bearing in mind. The presence of calculi is by no means necessary to the existence of gall-bladder infection, though stones are very commonly found in cholecystitis. In some instances it seems very probable that a traumatism due to the passage of stones into the gall-ducts has been the starting-place of the infection which later becomes a cholecystitis, while in others the stones seem to have been the result of cystic inflammation.

It would not be proper here to enter into a full discussion of the pathology of gall-bladder disease. It is my wish merely to bring out certain points of general interest in the making of a working diagnosis in the more acute forms of this class of cases and to do what little I can to place the treatment upon the sure footing which has been reached in appendicitis. This can best be done by briefly discussing these more acute disorders of the gall-bladder and ducts, occasionally illustrating by typical histories.

Cholecystitis without gall-stones may occur as a primary or secondary disease. It is sometimes impossible to determine where the infecting organisms have gained entrance. The disorder usually begins with pain and fever, the latter of a more or less septic type. The pain may be diffuse at first, as in appendicitis, but even then palpation of the right hypochondrium will demonstrate extraordinary tenderness. The abdomen is frequently so tense on account of muscular spasm that nothing objective can be made out unless general anæsthesia is resorted to. Jaundice, though common, is not a necessary sign.

It must be remembered that the location of the gall-bladder may vary within extremely wide limits, and here, too, the parallelism between the gall-bladder and the appendix is to be noted. Under tension, especially, the viscus may become twisted to a remarkable degree, its fundus lying well to the left of the median line, while under full distention it may be far below the umbilicus. A number of times I have seen a gall-bladder exposed at operation when from the symptoms and the physical signs the appendix had been confidently diagnosed as the offending organ. This has occurred but once in my own practice, and, as the case is one in point, I will briefly refer to it.

CASE I.—The patient was a little girl of six, whom I saw one night a few years ago in consultation. In the beginning there had been a convulsion, and the child was semicomatose at the time of my visit a few hours later. The abdomen was extremely rigid, so that anything like satisfactory palpation was impossible. There were signs of increase of pain on even light manipulation of the right iliac region. The temperature was very high and the pulse weak and rapid. Icterus could not be made out, on account of the artificial light. In short, the diagnosis of fulminant appendicitis, which had been made by the family physician, was fully concurred in by me and operation was urged. The parents refused their consent and I gave an extremely grave prognosis. To my surprise, a week later the child was admitted to Mt. Sinai Hospital to be operated upon for appendicitis. The first acute symptoms had subsided, but the sepsis, now of a more chronic type, was still evident. Jaundice was absent. Palpation now revealed a large mass in the right iliac region, which I took to be an abscess due to the perforation of the appendix. On opening the abdomen, the tumor was found

to be an enormously distended gall-bladder. The appendix, fully eight inches long, was free from signs of inflammation. No masses of any kind were felt along the gall-ducts. The appendix was removed and the gall-bladder sutured to the abdominal parietes and incised. It contained a large amount of pus, but no stones. Drainage by rubber tube inserted in the old manner, without inversion of the cystic wall, was followed by recovery in due time. No cause for the cholecystitis was ever discovered. It is interesting to note that the father of this child had but a few weeks before been operated upon for gall-stones.

CASE II.—A recent case of pure non-suppurative but septic cholecystitis was sent to my service in Mt. Sinai Hospital by a medical man who had observed it for some time. The patient was a woman, about thirty-eight years old, who had suffered repeatedly from attacks of what seemed to be renal obstruction. Without going into details, I may say that the diagnosis of probable pyonephrosis seemed reasonable. A tumor painful to the touch occupied apparently the position of the right kidney. There was some pus as well as casts in the urine, which was thought to come mainly from the comparatively healthy kidney, the opposite ureter being probably obstructed. The woman was slightly icteric and was acutely septic, the temperature varying between normal and 105.5° F. Myocarditis with an irregular heart further complicated matters. An attempt to catheterize the right ureter was made, but, on account of the miserable condition of the patient, I feared to prolong the anaesthesia, and so cut down at once upon the kidney through the lumbar region. It was apparently healthy. Taking advantage of an accidental nick in the peritoneum, the abdominal viscera were explored with the finger, which at once detected a tense, thickened, and enlarged gall-bladder. Closing the lumbar wound, with drainage, the patient was turned upon her back and an opening through the right rectus made. A mass of omental and intestinal adhesions explained the tumor which had been thought to be the right kidney, and, on peeling these adhesions away from the gall-bladder, several deposits of recent lymph were noted, one in particular, greenish in color and as large as a quarter-dollar, seeming to indicate an impending perforation. The gall-bladder was at once punctured and a sufficient quantity of the contents aspirated to relieve tension. Thick, bile-stained mucus, but no pus, was drawn into the

syringe. The cystic and common ducts were carefully palpated, with a negative result, and the walls of the gall-bladder were then sutured to the aponeurosis. The viscus was next incised, and, after inverting the walls of the incision by means of Lembert sutures, a rubber drainage tube was placed in position and firmly held by two other sutures, which further inverted the cystic wall, bringing its peritoneal surfaces towards each other. By this means persistent fistulæ, which are so annoying, may be prevented. Treatment directed to the general condition of the patient was persisted in, and I had the satisfaction of noting a speedy and steady recovery from a dangerous form of sepsis. At the end of a week, apparently normal bile flowed from the drainage-tube; so it was removed. The discharge ceased immediately.

Cholecystitis with stones in the gall-bladder may usually be diagnosed on noting the septic symptoms reviewed above, together with the presence of a characteristic tumor and probably a history of previous attacks, usually accompanied by jaundice. Occasionally the patient has been sufficiently observing under the physician's direction to have found calculi in the fæces. Pain in the right shoulder is an almost constant symptom. In palpating the abdomen to feel the distended gall-bladder the fingers should press well into the iliac fossa, the palm of the hand facing upward towards the patient's liver. Then, drawing the hand upward as if to grasp the fundus of the normally situated gall-bladder, one may usually make out the fundus of the viscus with considerable distinctness as a globular mass. In very acute cases this mass is intensely sensitive, but frequently, though the manipulation elicits a certain degree of pain, the organ may be palpated with great distinctness. Palpation across the patient's body, from median line to flank, is apt to be inaccurate, on account of the deceptive feel of the contracted right rectus muscle.

Cholecystitis in the presence of calculi is usually a surgical disease. The correct operative treatment depends upon the case. Until the abdomen is opened it is quite impossible to say just what ought to be done. The following cases will illustrate the usual surgical treatment and its results.

CASE III.—M. M., forty-four years old, was admitted to the hospital for the treatment of a hydrocele of the tunica vaginalis. There had been no history pointing to disorder of the liver or gall-

bladder. Some days after the injection of the hydrocele with carbolic acid, the patient had a typical attack of biliary colic, with enlargement of the liver and a tense and palpable gall-bladder. There was vomiting with jaundice, but very little fever and no acceleration of the pulse-rate. Septic symptoms, however, came on, progressing gradually until four days after the onset of the trouble, when the patient's temperature rose to the neighborhood of 103° F., with proportionate general symptoms. Operation was done in two stages, the distended viscus being aspirated to relieve tension and then sewn to the abdominal wall. Two days later it was incised and sixteen stones were removed, drainage by tube being established as described above. Convalescence was unimpeded. At the expiration of nine days, the flow of bile being apparently normal and free from pus, the tube was removed, and the discharge at once ceased.

CASE IV.—Annie B., thirty-nine years of age, had had attacks of pain in the hypochondrium radiating to the back, with jaundice and vomiting. The first attack, five months before she came under my observation, was accompanied by a chill, and recovery followed twelve days of illness, the treatment being purely medical. A tumor of the right hypochondriac region had been intermittently noted. On October 26, 1900, she entered Mt. Sinai Hospital, having suffered acutely with the usual symptoms for five days. There was vomiting at the onset and jaundice supervened, but there was no chill, though the temperature was elevated. A tender tumor could be felt projecting below the border of the somewhat enlarged liver. This patient was observed for three days, and, the disease not abating, operation was undertaken. Under chloroform a generous incision along the free costal margin and into the right rectus was made. The gall-bladder was friable and full of stones and infected bile. There were stones in the cystic, the hepatic, and the common ducts, which were incised and cleared out as well as possible, after the attempt to work the calculi back into the gall-bladder or onward into the intestine had failed. The gall-bladder also had to be opened for the removal of stones. There was a very free discharge of bile through the incision in the hepatic duct, the walls of which were too friable to hold sutures. The wound was closed in part with chromicized-gut sutures, through muscle, fascia, and peritoneum, the cutaneous portion being approximated by sterilized zinc plaster. A gauze drain was carefully placed down to the wounds in the ducts

and a packing inserted into the gall-bladder. The patient had not endured the operation very well, so the work had to be somewhat hurried. There was considerable fever and an attack of nephritis after this operation, but the woman finally recovered and was discharged two months and a half afterwards. Several stones were later spontaneously discharged from the sinus leading to the gall-bladder, which has now entirely healed. The patient is in the best of health.

CASE V.—This was a case of acute septic cholecystitis, with numerous calculi, occurring in the course of typhoid fever. Mrs. L., a lady forty years old, was in the third week of a rather severe typhoid when chills, severe abdominal pain, and tenderness in the epigastrium indicated the occurrence of a serious complication. There was no jaundice. A tumor quickly developed in the region of the gall-bladder and the symptoms of sepsis became rapidly more alarming. The temperature became irregular and rose to a degree hardly explainable in an uncomplicated typhoid of this type. Within twenty-four hours the tumor had moved to the epigastrium and had become very marked. It was dull or even flat on percussion, and from its "feel" gave the impression of an intra-abdominal abscess approaching the surface. One could hardly say whether it might be hepatic or connected with the intestine. Just before operation the temperature rose to the alarming height of 107° F., the pulse being rapid, weak, and somewhat irregular. On entering the abdomen, the thick-walled gall-bladder was at once encountered, twisted on its axis and bent upon itself so that the fundus, presenting below the border of the enlarged liver, lay directly beneath the abdominal parietes near the median line. It was hastily stitched to the aponeurosis and a quantity of pus withdrawn by the aspirator so as to relieve tension and the consequent suffering. The patient was then put to bed, with the intention of opening the gall-bladder in forty-eight hours. A refilling of the viscus, accompanied by great abdominal pain, compelled me to perform the second step of the operation on the following day, when many large and small calculi were removed and the gall-bladder was drained by tube. The acute septic symptoms due to the cholecystitis at once subsided, while the typhoid ran the usual course. When convalescence had been well established, an attack of gall colic alarmed the patient, but it passed away without serious trouble and has not been followed by others.

It was probably due to some stone which had not been removed or which perhaps had formed since the operation. Thoroughness in the exploration of the cystic and common duct was impossible at the primary operation, on account of the critical condition of the patient. It was ascertained that this woman had for years suffered from biliary colic, which had been pronounced "gastralgia" by another physician, probably because the attacks were not accompanied by icterus.

The fact is often overlooked that there may be an excess of bile in the urine and an absence of that secretion from the *fæces* without marked cutaneous or conjunctival jaundice. It is, therefore, a wise precaution on the part of the physician to examine the stools and the urine personally, rather than to take the word of the patient or his friends. Naturally, jaundice is not a necessary feature of cholelithiasis, though it is common in cholecystitis. Even when a stone has become firmly impacted within the cystic duct, there may be no icteric signs. Tumor, on the contrary, is usually present in the cystic-duct obstruction, as one might easily reason out, while it is rarely present in common-duct obstruction, in which jaundice is invariable. The pain of cholecystitis and of cystic-duct obstruction shoots into the right shoulder, while that of common-duct occlusion is of a boring character, radiating to the back. While severe, it is often steady, and not colicky or cramp-like. Fever may be intermittent when a calculus in the common duct is sufficiently movable to permit of periodic passage of the retained secretions. Careful examination may be necessary to differentiate between this condition and malaria. A patient suffering from this complication, but without inflammatory symptoms, was operated upon by me a few months ago (see the next case).

CASE VI.—Bertha K., about thirty-eight years old, had suffered for months with intermittent pain characteristically radiating to the back and accompanied by jaundice, which was never deep until the occurrence of the attack which brought her to the hospital. The diagnosis was made and proved by operation. Several small stones pressed together into a filbert-sized mass were removed from the common duct, which was then sutured with a silk purse-string. There were no stones in the gall-bladder and no suppurative disease. Recovery was prompt. (This patient was shown at a recent meeting of the New York Surgical Society.)

The operation of primary removal of the gall-bladder has been advocated as a radical curative measure when chronic disease has so changed the viscus that it is improbable that it will ever regain its normal condition. I refer to cholecystectomy as a matter of choice, and not to the removal piecemeal of a gangrenous viscus which one would not dare to leave within the abdomen. The gall-bladder is perfectly dispensable, and, when seriously diseased, may as well come out as the vermiform appendix. The operation for its removal is neither so dangerous nor so difficult in the majority of instances as one might imagine. Just as in appendicitis we sometimes are forced to leave the organ in place at the primary operation, so we may deal with the gall-bladder. When, however, the diseased viscus can be safely removed, it should be done, provided the gall-passages are unobstructed. A really radical cure may then be expected, instead of the mere relief which so often follows gall-bladder operations of a less thorough nature. The following histories will serve to illustrate.

CASE VII.—Bertha F., forty years old, had a history pointing vaguely to disease of the gall-bladder, but pain in the back with nausea and little fever made me suspect that a right movable kidney might be the principal factor in the disturbance. She was very miserable, and quite willing to undergo an operation of the most dangerous character for relief. A right movable lumbo-abdominal tumor, palpation of which gave a sickening sensation, seemed to be the point to which surgical attack should be directed; so the vertical lumbar incision was made as if for nephropexy. The kidney was freely movable and displaced downward, but it was found that the remainder of the tumor, and no small portion of it, was a tongue-like right hepatic lobe (Spigelius's lobe), and beneath it could be felt the thickened and enlarged gall-bladder containing stones. It contained little or no fluid, its walls apparently hugging closely the contained calculi. Nephropexy was performed, the space formerly occupied by the displaced kidney was packed with gauze to promote adhesions, and the patient was turned upon her back and the anterior incision made. The gall-bladder, after careful exploration of the ducts, was removed, the cystic duct being ligated with chromicized catgut. The groove in the liver which had been occupied by a portion of the circumference of the gall-bladder, and which was raw and bleeding on account of the removal of the peritoneum with

was closed with a row of eight sutures, bringing the edges of the incision together and at the same time effectually closing the gallbladder. Recovery was prompt. This gallbladder was removed, as the specimen will show. The gallbladder was still to be seen and might easily be mistaken for a flattened bladder. (Fig. 1.)

A. M. was a thirty-year-old girl, without previous gallbladder trouble, who suddenly fell into the symptoms of acute cholecystitis. There was no jaundice of the skin or mucous membranes, but the scleræ were of a yellow color. Colic was severe, the gallbladder enlarged to the size of an egg under ray observation. On May 8, 1900, at the time her temperature was 101.4° F., pulse 110, respirations 32, there were marked evidences of cholecystitis, tenderness of the gallbladder, considerable abdominal distention, and a few hours of pyrexia. Extreme obesity rendered it practically impossible to locate the gallbladder. The patient was operated on a number of the gallbladder complications mentioned, either before or after the hospital operation is not certain. Internals of a high caliber were used and was row of small stones were seen, the gallbladder full of calculi was encountered, and the cystic duct when cut was free and apparently normal in position. The removed gallbladder was removed, closed with a row of eight silk and hemostasis ligatures, tied by means of two long clamps, one taking in the gallbladder and the other the cystic duct. The clamps were left in place and the incision closed. In twenty-eight hours the clamps were removed, recovery was prompt, except that the patient was not able to get off for two months. The gallbladder was removed and weighed and sixty-two stones. (Fig. 2.)

IX. An instance of the remarkable manner in which gallstone may cause unexpected trouble of a character hitherto unknown without surgical exploration, the following history will illustrate. Mrs. H., sixty-four years old, had never suffered from gallbladder disease, so far as she knew. There had never been any colic of any kind and never jaundice. For three years before I saw her she had been suffering from constant nausea and vomiting. The disorder having first appeared soon after a heavy attack of influenza, was rapid loss of strength and finally some fainting spells. She died insufficiently several days before my first visit.

PLATE I.



FIG. 1.—Gall-bladder laid open, showing two large stones *in situ*. (Natural size.)



FIG. 2.—Gall-bladder which contained numerous small faceted stones. (Natural size.)

the gall-bladder, was closed with a row of catgut sutures, bringing the peritoneum over the defect and at the same time effectually checking the bleeding. Recovery was prompt. This gall-bladder contained two very large calculi, as the specimen will show. The enlarged right hepatic lobe is still to be felt and might easily be mistaken for a distended gall-bladder. (Fig. 1.)

CASE VIII.—Mary N., thirty years old, without previous gall-bladder history, became violently ill with the symptoms of acute septic cholecystitis. There was no icterus of the skin or mucous membranes, but the stools were clay-colored. Colic was severe, the pain radiating to the shoulder. She came under my observation first on May 8, 1900. At that time her temperature was 101.4° F., pulse-rate 140, and respirations 32. There were marked signs of congestion at the bases of the lungs and considerable abdominal distention, though without signs of peritonitis. Extreme obesity rendered it practically impossible to palpate the gall-bladder. The symptoms continued, but, on account of the pulmonary complication, until eight days after her admission to the hospital operation was not undertaken. Icterus had gradually increased and was now well marked. A tense, thick gall-bladder full of calculi was encountered, and, as the cystic and common ducts were free and apparently normal on palpation, the unopened gall-bladder was removed, the cystic duct being ligated with heavy silk and hæmostasis being accomplished by the use of two long clamps, one taking in each layer of the peritoneum. These were left in place and the wound was partially sutured. In forty-eight hours the clamps were removed, and thereafter recovery was prompt, except that the silk ligature was not cast off for two months. The gall-bladder was found to contain seven hundred and sixty-two stones. (Fig. 2.)

CASE IX.—As an instance of the remarkable manner in which these large stones may cause unexpected trouble of a character impossible to diagnose without surgical exploration, the following history is abstracted. Mrs. H., sixty-four years old, had never suffered from gall-bladder disease, so far as she knew. There had never been attacks of colic of any kind and never jaundice. For three weeks before I saw her she had been suffering from constant nausea and vomiting, the disorder having first appeared soon after a heavy meal. There was rapid loss of strength and finally some fever. The bowels moved insufficiently several days before my first visit,

PLATE I



FIG. 1.—Gall bladder laid open, showing two large stones *in situ*. (Natural size.)



FIG. 2.—Gall bladder which contained hundreds of small calculi. (Natural size.)

[illegible]

It is not surprising that the results of the present study are consistent with the findings of other studies. For example, the results of the present study are consistent with the findings of the study by Smith et al. (2001) who found that the use of a decision support system (DSS) can improve the performance of decision makers in a complex task. The results of the present study are also consistent with the findings of the study by Jones et al. (2002) who found that the use of a DSS can improve the performance of decision makers in a complex task. The results of the present study are also consistent with the findings of the study by Brown et al. (2003) who found that the use of a DSS can improve the performance of decision makers in a complex task.

On the other hand, by Nagai's theorem, \mathcal{A} is a \mathcal{P} -algebra if and only if \mathcal{A} is a \mathcal{P} -algebra, and the following theorem is a direct consequence of the above results.

... but the fact that the ... of the ...
... and ... to the ... of the ...
... on May 8, 1900. At ... of the ...

[illegible]

deret til påviser, at disse skæbener er af samme art som de tidligere skæbener, som er blevet undersøgt. De tidligere skæbener er blevet undersøgt ved hjælp af en række forskellige metoder, og det er blevet vist, at de er af samme art som de tidligere skæbener, som er blevet undersøgt.

[illegible]

The authors would like to thank the referees for their constructive comments and suggestions. The authors would also like to thank the editor for his/her valuable comments and suggestions.

...and the political arena. The new left has been
...by success. In fact, the new left has been
...after recognition, and the new left has been

the following is a list of the most important results of the present work. The first two are theorems, the third is a lemma, and the fourth is a corollary. The first two theorems are proved in the first section, the third lemma in the second section, and the fourth corollary in the third section. The first theorem is a generalization of the second theorem of the first section of the first volume of the *Journal of the American Mathematical Society*, and the second theorem is a generalization of the first theorem of the first section of the first volume of the *Journal of the American Mathematical Society*. The third lemma is a generalization of the first lemma of the first section of the first volume of the *Journal of the American Mathematical Society*, and the fourth corollary is a generalization of the first corollary of the first section of the first volume of the *Journal of the American Mathematical Society*.

"I wish to see a case made out of which I can learn
 something without suffering damage to the fabric
 of my mind." Mrs. Loring's eyes poured forth a heavy

2014年12月10日，在“2014年中国法治发展论坛”上，中国政法大学教授、中国法治发展研究中心主任朱玉峰在发言中，对“中国法治发展”进行了全面、系统的梳理和总结。他指出，中国法治发展在2014年取得了显著成就，主要表现在以下几个方面：

It is important to have a clear picture of the process of aging and the loss of strength and flexibility so that the appropriate interventions can be initiated several days before any physical decline is evident.

PLATE I.



FIG. 1.—Gall-bladder laid open, showing two large stones *in situ*. (Natural size.)



FIG. 2.—Gall-bladder which contained numerous small faceted stones. (Natural size.)

and the vomited matter became offensive. Recognizing a progressive but as yet incomplete intestinal obstruction, operation was proposed and accepted. Vague right iliac resistance was made out with difficulty on account of abdominal distention and rigidity, but became plainer under the influence of the anæsthetic. Incision as if for appendicitis disclosed great distention and congestion of the small intestine, with adhesions about a tumor in the right iliac region and considerable free fluid in the abdominal cavity. Loosening the adhesions, which were of recent lymph, an object could be felt within the ileum, and the intestine below or distal from this object was collapsed. The object was extracted through a longitudinal incision in the gut (afterwards closed by suture), and proved to be a gall-stone cubical in shape and completely occluding the lumen of the intestine. The size and shape of the stone were found to be about the same as those of a partly-used piece of billiard chalk. It could not have passed through the gall-ducts, and how it got into the intestine by ulceration without greater constitutional disturbance I am at a loss to imagine. The patient made an excellent recovery.

It is my belief that the time is not far distant when the removal of the gall-bladder without inflammatory disease, but merely to get rid of gall-stones and their dangers, will be of common occurrence. This opinion is strengthened by the ease and safety with which I accomplished this in the following case.

CASE X.—Jette S., twenty-nine years old, came to the hospital with a diagnosis of gall-stones and consequent frequent colic, some of the stones having been found at various times in the stools. There had never been symptoms of inflammation, the pains usually subsiding suddenly and completely. The colic was so frequent and severe, however, that the patient gladly consented to operation. The ducts were explored and the viscus readily removed by the method already described, the raw liver surface being covered by peritoneal flaps. There was some suppuration at the stump of the cystic duct, but recovery was otherwise unimpeded. The unopened gall-bladder is still in my possession.

The histories which have been given in this paper are, with one exception, selected from those of patients whom I have operated upon during the past year. Two cases which terminated fatally must also be mentioned here, since they teach by contrast.

CASE XI.—The first of these patients was a woman, forty years

old, who had for years suffered from recurring attacks of cholecystitis with jaundice. I operated upon her in deep jaundice on April 3, 1900, and she died of hemorrhage. A small vein in the region of the common duct was shown post mortem to have been the principal though not the sole cause of the bleeding. It was recognized at the time of operation that steady but not alarming hemorrhage was going on, and packings which under ordinary circumstances would have been sufficient were carefully put in. Death came within twenty-four hours.

CASE XII.—The other patient was also a woman, septic and much run down on account of common-duct obstruction. Here, too, there was deep jaundice. The progress of the case made it evident that without operation life could not be much prolonged. This patient died within forty-eight hours from shock.

With the exception of cases of malignant disease these are the only deaths which have occurred during the year, and they might have been avoided by more timely intervention.

In conclusion, let me call your attention to the fact that, as in so many other grave abdominal diseases, the disorders of the gall-bladder and ducts respond to surgical treatment in direct proportion to the timeliness of the operation. For reasons which I am absolutely unable to comprehend, the average practitioner of general medicine waits longer in gall-bladder disease before he calls the surgeon than he does in any other grave abdominal lesion. The results of operation, with but rare exceptions, are to be studied with this point in view. If the percentage of cures be high, it is so in spite of the most adverse circumstances, and if the cures be few and the death-rate high, we must remember that most of the patients who submitted to operation did so as a last resort, when the disease itself immediately threatened life and the vital forces had been sapped and undermined by long-continued sepsis and the disturbances incident to chronic icterus.

SOME RESULTS OF MICROBIC INFECTION IN URINARY DISEASE.

BY HERBERT T. HERRING, M.B., B.S.,
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IN the treatment of urinary affections strict aseptic precautions are so important as to call for far more attention from the profession than they have hitherto received. If they were efficiently carried out, many of the most distressing urinary symptoms, and consequently many operations now rendered necessary by a septic condition, would undoubtedly be avoided. The writer, therefore, proposes to point out some of the more marked symptoms produced by their neglect. At the present time the greater proportion of urinary diseases are at some time associated with, if not actually caused by, an inflammatory condition of the organs. This inflammation—excluding those forms arising from the administration of toxic drugs, the wounds of aseptic instruments, and the introduction of chemical irritants—is due to the presence of some micro-organism, often introduced into the bladder from without, and frequently by septic instruments used for the purpose of treatment or of examination. Infection thus occurring in an otherwise healthy bladder generally causes an attack of acute cystitis, from which the patient recovers in a short time, the severity depending on the “dosage.” If, however, the patient is already the subject of some urinary disease, as retention of urine, calculus, tumor, or stricture, the affection takes the chronic form, producing special complications and symptoms, in addition to those already existing, which may now be considered more in detail.

Chronic cases of retention as the result of paralysis or of obstruction to the outflow of urine are frequently met with. The bladder may be greatly distended, as is evident from abdominal examination, and the characteristic symptom of great frequency of micturition, especially at night, is well marked. But the urine, notwithstanding the evident chronic retention in the bladder, is

acid, clear or nearly so (in some cases it is slightly cloudy, from an excess of mucus and bladder epithelium), and contains no pus. In fact, it is sterile. After infection the desire to micturate is intensified, and the bladder in the endeavor to expel its contents is thrown into painful and prolonged spasms, which recur at short intervals. Hæmaturia is often noted, especially if the residual urine has been too rapidly withdrawn. The urine itself is alkaline in reaction, thick and offensive, and contains much ropy mucus, vesical epithelium, blood-clots, and various crystals of urinary decomposition, and teems with micro-organisms. Rigors and high temperature, due to the absorption of products of bacterial action on both tissue and urine, occur, associated with grave constitutional symptoms. The more remote consequences are exfoliation of the epithelium, causing superficial or deep ulceration; abscess, if the deeper layers are affected without this process; chronic engorgement of the vessels of the mucous membrane near the neck of the bladder; formation of phosphatic calculi, from the condition of the urine; and, lastly, extension of the inflammatory process along the ureters to the kidneys, more common when these canals have been dilated by long-standing backward pressure. The treatment of septic chronic retention should comprise (1) gradual withdrawal of the residual urine, so that irregular contractions of the bladder, causing folds and pockets, may be avoided. All instruments should be passed with strict aseptic precautions, even if the urine is already septic; otherwise fresh inoculations may take place, with prolongation of the acute stage. (2) The power and healthy condition of the bladder must be restored as far as possible. (3) When the organ has been emptied, the fresh supplies of urine are to be removed frequently, before they have time to undergo decomposition. Under this treatment the patient recovers gradually from the acute symptoms, often apparently entirely; but a careful examination of the urine will usually reveal the presence of pus and micro-organisms, and while these exist fresh attacks of a similar nature are liable to occur. All that can be said about cure in these septic conditions of the bladder is that it may be accomplished if the original disease be entirely relieved or removed, and of them all septic chronic retention holds out the least promise of complete recovery.

In stone the writer refers to those forms of calculi which originate in the kidneys as "sand" or "gravel,"—composed most com-

monly of uric acid,—and, descending into the bladder, lodge there, probably because the organ is unable to empty itself completely. The symptoms are increased frequency of micturition, more noticeable by day and on taking exercise, pain at the end of the penis after voiding urine and on movement, and hemorrhage caused by any exertion. When there is no bleeding, the urine is acid, and slightly cloudy perhaps from an excess of mucus and bladder epithelium. The stone itself is composed of concentric layers of uric acid. Contrast these symptoms with those which arise as soon as the case becomes septic. The frequency of micturition is more pronounced, troubling the patient both day and night and whether he is at rest or moving, pain and discomfort are constantly present, and the bleeding is more persistent and easily provoked. The urine is frequently neutral or alkaline, and thick from pus and mucus. The calculus is now coated with a layer of phosphates, often quickly deposited, with considerable increase of the stone. The treatment is, of course, the removal of the stone, with the hope that the urine will then regain its normal condition; but the fact that “residual urine” is so often present in the bladder prevents a favorable prognosis.

The characteristic symptom of papilloma of the bladder is intermittent and painless hæmaturia, increasing in severity and frequency as the tumor advances. The urine, when free from blood, is clear. Septic inflammation, even in the early stages of the disease, causes pain, increased frequency of micturition, and prolonged attacks of hemorrhage, quite out of proportion to the size of the growth. The urine is alkaline, thick, and offensive. The after-effects are ulceration and deposit of phosphates on or about the tumor, which increase the distress of the patient very much. The treatment is either the removal of the tumor entirely by operation—in any case the phosphatic deposit should be thus dealt with—or the daily application of weak solutions of nitrate of silver to the part, continued for many months, as suggested by Sir Henry Thompson, or a combination of both methods. The injections are employed to improve the septic condition of the urine and bladder, to check the hemorrhage, and to control the growth. Whatever treatment is adopted, and the writer has found the latter method most efficacious, it is exceedingly difficult to render the bladder and growth free from micro-organisms when once infected. With

regard to malignant tumors all that need be said is that the symptoms are exaggerated and the fatal termination of all such cases is accelerated.

A patient suffering from stricture, whether arising from injury or gonorrhœa, is conscious only—provided septic inflammation has ceased—of a gradual diminution of stream, accompanied by some perineal discomfort and perhaps increased frequency of micturition. Shortly after the introduction of a dirty bougie, the mucous membrane at or near the seat of stricture becomes inflamed and congested, this site being especially prone to attack, no doubt, on account of the injury and abrasion caused by the instrument. The stream is consequently decreased, and, should the stricture be at all narrow, retention results. Stoppage of urine from reaction—that is, inflammation set up by aseptic causes—is also sometimes produced by too severe instrumentation and dilation, but both causes are often associated. Pain also of a scalding character is complained of, and discharge appears at the end of the penis or may perhaps be easily seen as shreds—composed of mucus and pus—in the first portion of the urine voided. The remote consequences of septic infection of stricture are the formation of perineal abscesses and fistulæ, ulcerations in the neighborhood of the stricture, hemorrhage, and the extension of the inflammation to the bladder, and consequent chronic cystitis, with the possible formation of calculus. Among the most troublesome strictures to deal with are those subjected to severe and frequent instrumentation undertaken without any aseptic precautions whatever, as is evident from the rigors and fever which follow the operation. The treatment is the careful and gentle dilatation of the stricture, associated with suitable applications to the mucous membrane of the urethra and bladder. The prognosis, when the stricture can be freely dilated, is perhaps the most favorable of all cases of infected chronic bladder diseases.

To sum up, therefore: the introduction of micro-organisms gives rise in a healthy bladder to an attack of acute infective cystitis, and in one already subject to abnormal conditions to a chronic form, liable to exacerbations and very difficult to cure. Associated with this chronic condition are, first, constitutional disturbances (rigors, fever, etc.) due to bacterial intoxication, and not caused by the use of the catheter, as was formerly stated (hence termed “catheter fever”); and, secondly, special local complications in

addition to the characteristic symptoms of the particular disease in question. Formerly patients may have escaped cystitis although treated with septic instruments, owing in a great measure to the skill of the manipulator in avoiding injury and abrasions to the tissues. It is still most important that gentleness and care should be exercised in the treatment of urinary troubles, not to prevent infection, which should be impossible, but to avoid traumatic inflammation. Moreover, the writer would call special attention to those chronic forms of urinary infection in which the constitutional symptoms are predominant. He is convinced that many obscure symptoms associated with the nervous, the digestive, the respiratory, or the cardiac organs are often due to a septic condition of the tissues and the urine. Such symptoms would be easily accounted for if more care were taken in eliciting facts relative to urinary disorders and in the bacteriological examination of the excretion.

PROGNOSIS IN APPENDICITIS.

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APPENDICITIS is a disease presenting so many phases, possibilities, and complications that its prognosis cannot be dominated by statistics,—in hospital practice, at any rate. The figures which come to hand are frequently vitiated by the fact that the life history of a patient suffering from a first attack of appendicitis cannot always be followed up, and he may or may not have one or more subsequent attacks, the last of which perhaps proves fatal. The practice which obtains here of placing most cases of appendicitis, at least in the early stages, under the care of physicians is one which leads to some divergence of opinion on the question of prognosis between physicians and surgeons. Though there can be no doubt that physicians see cases of every degree of gravity, from the mildest to the most severe, yet the mild forms are most numerous in the medical wards. On the other hand, surgeons are called in to operate, as a rule, only on the severer varieties. Hence the natural tendency is with physicians to regard the disease as one not always of exceptional severity, while the surgeon is prone to believe that the possibilities are so far-reaching that most cases coming under his notice demand operation.

We are told by medical observers that eighty per cent. of cases recover without operation, whereas a surgeon of note has made the startling statement that there is a mortality of fifty-three per cent., a statement which is scarcely credible. The truth doubtless lies in the mean between these two extremes, and it will be arrived at when appendicitis is regarded as a purely surgical disease, to be treated in surgical wards from the first, not necessarily with a view to operation, but in order that surgical assistance may be forthcoming the moment it is called for. Further, it is highly desirable, in order to arrive at an accurate prognosis, for several observers

whose experience is large, and has extended over many years, to trace the life history of patients who have come under their care. It is just as irrational to excise all inflamed appendices, on the supposition that perforation will occur in some of them, as it is to treat every case by medical means alone.

We may ask ourselves how far surgical interference will reduce the mortality in cases not recovering under medical treatment. J. W. White¹ thinks that of the twenty per cent. not recovering under medical treatment alone, at least one-half may be saved by opening an abscess, and that of the other half, the subjects of perforation with diffuse peritonitis, a few will recover as the result of operation,—that is to say, the medical mortality of twenty per cent. will be reduced to from five to eight per cent. by surgery. In continuation of this aspect of the subject, we may ask upon what conditions does the success of surgical treatment depend? *Cæteris paribus*, children bear operations for appendicitis better than adults. But the prime factors must necessarily be the state of the parts affected and the day of the disease on which the patient comes under skilled treatment. It is certain that a large proportion of cases with perforation of the appendix, or gangrene with acute peritonitis, will die, but by timely interference a moderate proportion of these may be saved. The time at which an operation is done is an important factor. The statistics furnished by G. R. Fowler show that, of one hundred and twenty-seven cases operated upon within the first three days to the tenth day, the percentage of recoveries diminishes steadily from day to day, until on the sixth day it has fallen to fifty per cent. and on the ninth day to thirty-three per cent. That is to say, one-half of the patients who would have recovered by operation die if they wait till the sixth day and more than two-thirds if till the ninth or tenth day.

A valuable point in forming the prognosis of a case is secured by noting the temperature and pulse. A pulse rate of over 100, with a normal or subnormal temperature, is of the gravest omen, and immediate operation is demanded. There must be other factors which necessarily influence the success of surgical treatment. These are the ability and skill of the operator, his grasp of the technique of abdominal surgery, and his readiness and resource in

¹ Therapeutic Gazette, June 15, 1894.

meeting and overcoming unexpected difficulties; but no one can estimate these points except the operator, and, possibly, his critics.

However, certain facts stand out quite clearly. When an operation is necessary, the sooner it is done the better, and notice should not be taken of the number of hours or days of illness, but we should be guided only by the character of the attack and the symptoms presented. Also if the condition of the patient is such that the question of operation has come within the range of serious discussion on specific grounds, it is, as a rule, better to operate there and then, and avoid delay, because in the latter event serious symptoms may supervene which place the patient beyond the reach of any help.

In these days of a somewhat wide-spread knowledge of appendicitis in the lay mind, a patient who is recovering from a first attack will ask what are the probabilities of his suffering in a similar way again? That is, what is the probability of relapse, first, in cases treated medically, and secondly, in those treated surgically by opening an abscess but leaving the appendix behind?

With reference to the first point, of those treated expectantly about thirty per cent. suffer relapses, not necessarily of an acute form, but they experience discomfort, colicky pains, local rigidity, occasional vomiting, and constipation, and many suffer not one relapse, but several, even to as many as nine or ten, so that life becomes a burden, and the diseased appendix is a continual menace. As a rule, a relapse is less serious than a first attack, but in multiple attacks the danger does not diminish proportionately. In one of the relapses acute perforation and peritonitis may occur, and be fatal, although this is the exception. It is also known that patients are more likely to recover from operation for relapsed appendicitis than from a first attack, the explanation given being that the peritoneum has become less sensitive to infection. In connection with this point of operation after the primary attack, it should be remembered that, if a quiescent period be chosen for operation, the results are still better. Treves gives the mortality as one per cent. But it should be remembered that it is not always possible to find the offending appendix and remove it, chiefly on account of the dense nature of the adhesions and the danger to important structures. An operation designed to remove a diseased appendix may be simple or one of the most difficult in surgery.

With reference to the second point—namely, does recurrence take place in those cases where an abscess is opened and the appendix is not removed—I believe I am right in saying that very few cases of this nature are on record, and this seems to me a strong argument in favor of not attempting to remove a diseased appendix, when opening an abscess, unless it presents itself quite readily and can be taken away without risk to the limiting adhesions around the suppurating area.

A debatable question in prognosis is whether better results will be obtained by treating all cases surgically as soon as the disease is diagnosed. The justification advanced by advocates of abdominal incision within the first twenty-four or forty-eight hours in all cases is the probability that a certain number of them will develop acute and diffuse peritonitis, which might have been averted by an early operation. Now, in such cases the first symptoms which call attention to the state of the patient are those of acute and diffuse peritonitis, and they are not difficult of recognition. In these cases immediate operation is essential, and no surgeon will hesitate. But it can hardly be said that the occasional occurrence of deadly attacks affords sufficient ground for instant operation in all cases, whether mild or not. Certainly it seems that facts have not yet come to light of sufficient cogency to govern the treatment of appendicitis by the dictum, "Operate on all cases so soon as diagnosed." We must ask ourselves whether the mortality of the operation itself, together with diffusion of septic material into an unprotected peritoneum, will not more than counterbalance the advantages of early operation in every case.

No attempt can be made to deal with prognosis in cases complicated by intestinal obstruction, pylephlebitis, hepatic abscess, pyæmia, or others of the severe conditions occasionally seen. It cannot be doubted that extraordinary recoveries do take place against the most adverse circumstances, and, conversely, sudden and fatal results occur in patients apparently doing well.

SELECTED CASES OF APPENDICITIS.¹

ABSTRACTS FROM THE PUBLIC SATURDAY CLINICAL LECTURES DELIVERED AT
THE GERMAN HOSPITAL.

BY JOHN B. DEAVER, M.D.,

Surgeon-in-Chief to the German Hospital, Philadelphia.

EVACUATION OF APPENDICULAR ABSCESS; EXCISION OF THE APPENDIX.

H. L., male, white.—The boy was attacked on Christmas with sudden pain in the right iliac fossa, associated with tenderness. There was constipation, but no vomiting and no history of improper diet to account for the present illness. The pain varied in intensity. The boy returned to work for a day or two, but was compelled to stop.

On admission yesterday there were tenderness, rigidity, pain, and fever. Tenderness was marked this morning; the temperature was subnormal. Leucocytosis was not present.

When the abnormal rigidity is high on the right side, cholecystitis must be differentiated. Vomiting is constant in acute inflammations of the gall-bladder, and while also common in appendicitis, it has not occurred in this case. Nephritis, pyelitis, and pyelonephritis must also be excluded. The report of the urinary examination is as follows: yellow, acid, specific gravity 1030, no albumin, no sugar, no casts.

Operation.—After proceeding in the usual manner, the small bowel, which was forced through the wound, was covered by moist gauze. The margins of the wound were grasped by retractors and an effort made to introduce gauze packing with long dressing-forceps in order to control the coils of bowel. The patient took the anæsthetic badly and resisted all efforts to pack the abdominal

¹ From reports by Drs. Godfrey, Ellis, and Cooley. Edited by Drs. A. D. Whitting and A. O. J. Kelly.

cavity. The head of the table was lowered, the wound covered, and chloroform substituted for ether, after which relaxation was quickly obtained.

Hot, moist gauze was introduced by long dressing-forceps. The appendix was found to be retrocolic and very high. Pus was present. It was impossible to reach above the appendix without great risk, so the wound was enlarged upward. Iodoform gauze was packed about the appendix, the small pus collection was sponged away by gauze moistened in a solution of bichloride of mercury and carbolic acid, and the appendix was enucleated by the finger. The cæcum was tied down in such a manner that it was impossible to suture its walls at the site of the appendix; the latter, therefore, was tied off and cut away. The pedicle was washed by a solution of bichloride of mercury and carbolic acid and sponged by iodoform gauze. Two pieces of iodoform gauze drainage were placed behind the cæcum and brought out of the middle of the wound. The gauze packing was removed, and the wound closed and dressed in the usual manner.

The patient was very restless on the second day, with a temperature of 100.6° F. The wound was dressed, but nothing abnormal found. The gauze and stitches were removed on the fourth day and rubber drainage inserted into the wound. On the third day distention was present, with a running, rapid pulse. Hiccoughs developed on the fourth day and were uncontrollable. The patient died on the fifth day.

Examination of the excised appendix revealed the lesions of acute ulcerative appendicitis.

Thorough anæsthesia, especially in septic cases, is essential to the safety of the patient and the comfort of the surgeon. A sudden effort of the patient may force a knuckle of bowel into the field of operation, with fatal septic infection as a result. This thorough anæsthesia is sometimes impossible on account of some underlying constitutional condition. Prolonged rigidity under anæsthesia may result from a neurotic or apprehensive state of mind, from a kidney lesion, or from a pus collection in the abdomen. In the last condition the patient often becomes cyanotic, bedewed with perspiration, and rigid and resisting under ether.

The question of the opportune time for operation in appendicitis is one upon which surgeons will probably never agree, the

decision resting solely upon personal experience. In the German Hospital early operation is strongly advised. Our house surgeons and nurses, who have seen so many of these cases, uniformly present them for operation at the onset of acute symptoms. This is the strongest argument that can be offered.

REDRESSING OF AN APPENDICULAR ABSCESS.

At operation the wound was dressed with a view to the application of ice over it. Active peritonitis was anticipated, and this fear was fully realized, the patient being saved only after a most desperate struggle. Having escaped death from peritonitis, there yet remain to be encountered possible intestinal obstruction, fecal fistula, and ventral hernia.

Five strips of iodoform gauze are noted on the temperature chart as remaining in the wound. This gauze has not been disturbed since the operation, the external dressings only having been replaced.

A sterile Kelly pad was placed under the patient. Rubber gloves were worn by the surgeon. The dressings were removed; the retaining stitch was cut. The strips of iodoform gauze were soaked with sterile water and removed separately. The drainage-tube was removed and the cavity washed and inspected. A single large strip of iodoform gauze was packed in the cavity. Dry gauze dressings were applied, fixed by adhesive strips and covered by a roller bandage which was bound by adhesive strips.

[NOTE.—The use of the rubber tube in connection with the gauze drainage is to carry off the fluid from the hypersaturated gauze.]

Necrosis of the bowel may be brought about by too great pressure from the iodoform gauze introduced for drainage. A pus accumulation lying against the wall of the bowel may rupture it and thus be evacuated. Again, long-continued pressure may destroy the nutrition of the cæcum to such a degree that subsequent to operation the wall gives way and a post-operative fecal fistula results. Hence avoid any undue pressure by the gauze drain.

The gauze excites an abundant exudate. On its removal the cavity becomes extra-peritoneal and can be washed out with comparative safety.

Drainage of retrocæcal or retrocolic abscesses through the loin

is frequently advantageous. In the present case the collection of pus did not reach high enough to indicate this method.

Five varieties of appendicular abscesses may be described, according to the situation, as follows:

(1) Retrocæcal or retrocolic. When retrocæcal, the walls are formed by the cæcum, the mesentery, the coils of small bowel, and the omentum; when retrocolic, the colon, its mesentery, the omentum, and the lateral parietal peritoneum wall the abscess mass. This is the most frequent site of abscess and is the variety most easily evacuated and drained.

(2) Anterior to the cæcum. Here the abscess is beneath the anterior abdominal wall and is walled by the cæcum, the coils of small bowel, the omentum, the mesentery, and the parietal peritoneum.

(3) Pelvic, in which the abscess is shut off from the general abdominal cavity by the sigmoid and meso-sigmoid or small bowel and great omentum.

(4) Median, in which the abscess is to the inner side of the cæcum. The cæcum, the coils of small bowel, the mesentery, and the omentum confine the abscess. This is a most dangerous situation.

(5) Diffuse, with septic peritonitis. The micro-organism may be of such virulence that no inflammatory reaction to the extent of making the collection a local one can take place and the septic organisms are rapidly disseminated throughout the entire peritoneal cavity.

Peritonitis in all forms is infective. Streptococcus infection (the most fatal) is, fortunately, rare. A typical case was lately in the Children's Ward. The child was admitted with a temperature of 103° F. There was no appearance of illness and the abdominal examination was not distinctive. There was no mass in the right side. The illness began the day before. Operation was performed and a pus collection behind the colon was evacuated. The odor of the pus was characteristic and the examination of the culture demonstrated streptococci. The cavity was cleaned and drained. At night the temperature was higher than in the morning; next day it ranged between 106° and 107° F. The child died that evening. Post-mortem cultures showed a diffuse streptococcic peritonitis.

In this class of cases any surgeon will have a large mortality. And should you hear of a surgeon who has not had a death as a result of appendicitis, it may be assumed that he has not dealt with streptococcic cases, unless the latter were late and circumscribed. Likewise, one cannot justly criticise any surgeon's high mortality without a knowledge of the character of the cases with which he has been confronted.

Not all acute cases are operable. To draw the line of discrimination is difficult, sometimes impossible. At any rate, the question must be carefully considered. A case which we have lately seen in consultation illustrates well a class of non-operable cases. The patient had been ill two days. His physician, who is thoroughly familiar with the symptoms of appendicitis, waited thirty-six hours before arriving at a diagnosis. There was a history of an attack of peritonitis two months previously, to which the patient almost succumbed. In the present illness the symptoms were those of general peritonitis, and the physician, reasoning that in the male sex appendicitis is its most frequent cause, made that his diagnosis. The symptoms were nausea and vomiting, diffuse abdominal pain, universal tenderness, and rigidity. After thirty-six hours the tenderness and rigidity became more marked upon the right side. How can the history of the previous peritonitis and the present symptoms of primary general peritonitis, rigid and distended abdominal walls, vomiting, small tense pulse, and retention of flatus be accounted for? There was no exacerbation of the symptoms sufficiently severe to indicate perforation of the appendix. The condition cannot be explained except by the theory of the migration of the micro-organisms through the inflamed organ.

We declined to operate. To open the abdominal cavity would simply add fuel to the fire and render the cure worse than the disease. Treatment was instituted as follows: dry sinapisms were applied to the epigastrium to control the vomiting, four ice-bags were placed over the abdomen, salines were given to produce free watery evacuations, no food was allowed, enemata of warm water were given, and stimulation by strychnine injected hypodermically. The patient is better; we believe that he would have perished under operation. •

The *contra-indications* to operation are acute general peritonitis

and collapse. If such cases of appendicitis must die, it is better that they die without the interference of the surgeon. So-called rules for operation are laid down in certain books. There are no fixed rules. Depending upon the surgeon and the particular case, each is a law unto itself.

ACUTE APPENDICITIS.

E. S., female, white.—This attack, which is the second, began two days ago. Sudden acute abdominal pain marked the onset of the symptoms. Neither nausea nor vomiting was present. The bowels were moved by salines. On admission yesterday the temperature was 100° F. This morning it was 99.2° F. Examination showed marked tenderness and rigidity. On palpation, a small mass was found over the region of the appendix.

The abdominal cavity was opened in the usual manner. Coils of small bowel were attached to the appendix. It was very long and pointed towards the spleen. There was no pus. The appendix was removed in the manner described on page 224. Examination of the extirpated appendix revealed the lesions of acute ulcerative appendicitis without perforation. The wound was closed without drainage by tier sutures, and the usual dressing was applied.

On the third day a stitch abscess developed. With that exception, the case had an uninterrupted recovery, and was discharged on the fortieth day.

In *acute cases*, while no pus may be present, the precautions of careful packing should, nevertheless, be taken in anticipation of such a septic condition. Otherwise a small focus, suddenly uncovered, might suffice to turn the scale to a fatal issue.

The *adhesions of the small bowel* to the appendix in this case explain how a fecal fistula may involve the small bowel with the large.

A *stitch abscess* is very mortifying to the surgeon, and is to be avoided only by unceasing observance of the sterilization and technique of his assistants. The bacteriologist takes cultures from the disinfected hands and gloves of every one. He has just made report that a culture was obtained from his last study; and as a result all have sterilized their hands with increased carefulness.

CASES OF CHRONIC APPENDICITIS.

S. G., female, white, aged twenty-three years.—This patient was admitted to the hospital with a history of having had two attacks of appendicitis, attended by marked pain and tenderness in the right iliac fossa, nausea, and constipation; no vomiting. Free purgation relieved the symptoms, with the exception of a burning sensation over the appendix, which has been constant.

Operation.—An incision about one and one-half inches in length was made within the outer border of the right rectus muscle, above the level of the anterior superior iliac spines. The index finger of the left hand was introduced through the wound, and the cæcum recognized by its anterior longitudinal band. With a pair of long tissue-forceps passed over the finger, the cæcum was grasped and delivered into the wound. The appendix was delivered.

The appendix was long, retrocolic, and bound to the bowel by a very short mesentery. The mesentery was tied off in four sections by silk ligatures and divided. The appendix was lifted by the assistant and cut out of the cæcum. The cæcum was then closed by double rows of continuous silk sutures, the second being Lembert. Black silk and a straight needle carried on a hæmostatic forceps were used.

The bowel, which had been covered by moist gauze, was then returned through the wound by patient manipulation under moist gauze. The wound was closed without drainage by two through-and-through sutures of silkworm gut and a continuous stitch of the sheath of the rectus muscle. The through-and-through sutures were passed by a Reverdin needle.

Dressings of gauze moistened in a solution of bichloride of mercury, dry gauze, and gauze-cotton pad were applied, fixed by adhesive strips and by a tailed-bandage which was bound by adhesive strips. A sterile towel was pinned over the bandage.

The patient made an uneventful recovery. The wound healed by first intention; the stitches were removed on the twelfth day, and the patient was discharged December 11.

Examination of the excised appendix revealed the lesions of chronic interstitial appendicitis.

R. P., male, colored, aged thirty-eight years.—Acute abdominal

pain, general at first and then localized, with tenderness, vomiting, muscular rigidity, abdominal distention, and constipation, were the symptoms in this case. They were as sudden in onset as are those of apoplexy.

In a male with these symptoms of violent sudden onset, acute cholecystitis, acute hemorrhagic pancreatitis, and appendicitis must be differentiated. The first, especially the gangrenous form, is more fatal than appendicitis, and is, fortunately, more rare. Acute hemorrhagic pancreatitis is most frequent in adult males addicted to alcohol, and usually occurs during recovery from a debauch. Acute abdominal pain, perhaps most marked in the upper part of the abdomen, comes on with symptoms as named above. The temperature is at first low, but afterwards quickly rises, with rapid pulse.

In the female, ruptured extra-uterine pregnancy, the twisting of an ovarian cyst on its pedicle, salpingitis or tubo-ovarian abscess of the right side, suppuration of an ovarian cyst, pelvic hæmatoma, appendicitis, acute intestinal obstruction, and ptomaine-poisoning are very frequently to be differentiated.

The symptoms arising from the twisting of the pedicle of an ovarian cyst are such as to render a differential diagnosis from acute intestinal obstruction impossible. A few days ago a woman aged sixty, who had been suddenly seized with acute abdominal pain, was seen in consultation. On the arrival of the physician, her temperature was 97° F., and he, believing that the condition was acute intestinal obstruction, very properly administered morphine hypodermically in the absence of immediate operation. On examination of the abdomen, hyperperistalsis of the coils of the bowel through the abdominal wall was observed, and the case was diagnosed as acute intestinal obstruction. Another physician summoned by the family agreed to this. Upon operation one hour later, no intestinal obstruction was found, but a small ovarian cyst which was twisted upon its pedicle; upon the removal of this all the symptoms disappeared. This illustrates the onset of the symptoms which, upon the right side, would readily stimulate appendicitis. The case also shows the importance of prompt surgical interference. By the following day the strangulated mass would readily have been invaded by active infectious bacteria.

Closely simulating appendicitis was a case of pelvic hæmatoma

occurring in a young girl who, during menstruation, attempted violent exercise, and in which the broad ligament was filled with a clot from a ruptured vein. Here, again, the proper plan was immediate operation.

Ptomaine-poisoning presents very active symptoms, and the surgeon should bear in mind the methods of diagnosis to discriminate this condition.

The *pain* in appendicitis is at first general, then umbilical, and finally becomes localized in the right iliac fossa. In the majority of cases this is in the area described as McBurney's point. The point is variable with the position of the organ,—retrocæcal or retrocolic, median, pelvic, or to the outer side of the iliac fossa.

Muscular rigidity is generally looked for in the right rectus muscle. It is not always so marked in that muscle as in the flat, oblique muscles of the abdominal wall just over the organ. The muscular fibres are on guard over a local point in response to an intra-abdominal irritant. Therefore the rigidity should be tested over the point of greatest tenderness. The pain is of little importance as compared with the local evidence of rigidity and tenderness.

In this patient the physician made a diagnosis of appendicitis; and although the symptoms had subsided, and the patient had apparently recovered, he was sent here for operation. He was not well yesterday. The pain, tenderness, and rigidity have again returned. There has been no recovery; on the contrary, the condition is latent and ready at any time to become active. If the symptoms have returned in this patient while completely at rest on the broad of his back, it can readily be understood how much greater would be the danger of sending a patient out early after his apparent recovery, to invite a second attack. If operation were deferred in this case the characteristic symptoms would progressively redevelop.

Operation.—Incision was made within the outer border of the right rectus muscle, in the upper half of the space between the umbilicus and pubes, and the abdomen opened in the usual manner. The incision was long, the patient being very large and muscular. The appendix was retrocæcal, directed upward. It was brought into the wound and removed as described on page 224. The wound was closed without drainage by the tier suture, and the

usual dressing applied. The stitches were removed on the eleventh day, and the patient discharged on the twenty-third day, the wound having healed by first intention.

The *pathological specimen* is typical and most valuable. Macroscopically, the appearances point to another attack which has been interrupted in the stage of onset. The bright injection has faded and the swollen organ has contracted since its exposure to the air. Pus is doubtless contained within. A microscopic examination (made later) revealed the lesions of chronic interstitial appendicitis with acute exacerbation and the presence of pus.

Incision may be made over the point of tenderness in those cases in which a dense mass of exudate lies beneath the anterior abdominal wall. The pus may thus be evacuated and perhaps the appendix may be found loosely attached to the abscess wall, in which case it can at once be removed. If the appendix is tightly adherent, the cavity should be packed with iodoform gauze, the skin of the patient again sterilized, the aseptic coverings renewed, and the instruments and rubber gloves of the operator and his assistants replaced by freshly sterilized articles. Incision may then be made in the median line of the abdomen, the general abdominal cavity packed off, and the appendix again attacked through the first incision. What I prefer is to open the general peritoneal cavity to the inner side of the mass, to pack off and to evacuate the abscess, and then to remove the appendix.

L. W., male, white, aged twenty-two years.—This patient was admitted to the hospital with a history of a previous illness characterized by sudden onset of general abdominal pain and tenderness which later subsided and became localized in the right iliac fossa, by abdominal rigidity, and by elevation of both temperature and pulse-rate. For one year the patient has suffered from dyspepsia and vague abdominal discomfort that has culminated in the present attack, in which all the characteristic symptoms of appendicitis are again marked.

Dyspeptic symptoms are often indicative of chronic inflammation of the appendix. The fact is interesting as bearing on the rôle which the appendix plays in the digestive processes. While it is regarded as a functionless organ, it yet exercises an important bearing on the economy. In many instances all the symptoms of

obstinate intestinal indigestion of four or five months' duration have disappeared upon the removal of the appendix.

As an instance, a patient, robust, corpulent, athletic, with powerful abdominal muscles, had taken a morning aperient daily for some time. Distressing symptoms of intestinal indigestion came on about four hours after each meal, and an attack of appendicitis finally developed. Operation was recommended, but in the consultation the question was raised whether it was advisable after recovery from the first attack, and as a result the patient left the hospital, declining operation. The intestinal symptoms continued, and a second attack soon followed. The appendix was then removed. Nine months have elapsed since the operation, and the constipation, indigestion, and abdominal discomfort have all disappeared, although the patient is still a large and indiscreet eater.

Even if without a function, the appendix is yet a diverticulum of the alimentary canal, and anatomically is completely analogous to the larger intestinal canal in its serous, muscular, submucous, and mucous layers, glandular apparatus, mesentery, blood, and nerve supply. Therefore it is of importance pathologically as an organ especially liable to involvement in an acute process, and one which, when chronically inflamed, will derange the intestinal functions to a marked degree.

Operation.—An incision about one and one-quarter inches in length was made within the outer border of the right rectus muscle and the abdomen opened in the usual manner. The appendix was located with the index-finger and brought into the wound by means of a pair of dressing-forceps. It was removed in the way already described. There were no adhesions and very little bleeding. The wound was closed without drainage and dressed. The stitches were removed on the seventh day, and the patient was discharged on the thirteenth day, the wound having healed by first intention.

Examination of the excised appendix revealed the lesions of chronic interstitial appendicitis.

C. S., male, white, aged twenty-three years.—This patient was admitted to the hospital with a history of having had his first attack of appendicitis one year ago. He has had several since that time. During September he had a sharp attack, with nausea, vomiting, pain, and tenderness in the right iliac fossa, and in November another with similar symptoms. The last attack began three days

ago, with nausea and vomiting, pain, tenderness, and rigidity. The etiological factor in each instance was apparently acute indigestion, the result of indiscreet diet.

Operation.—Incision was made within the outer border of the right rectus muscle, and the abdomen opened in the usual manner. The region of the appendix was explored by a finger within the wound. The large bowel was recognized by the anterior longitudinal band. Guided by the finger, the cæcum was grasped by long dissecting forceps, and without difficulty drawn through the wound, when the appendix was removed.

The cæcum was covered with moist gauze. The meso-appendix was divided by scissors, the vessels being caught by forceps, and was then tied off in several sections by silk. The cæcum and meso-appendix at the base of the appendix were infiltrated and very vascular, showing a tendency to bleed when touched. A retractor was placed behind this mass to guard the hæmostatic forceps, which were applied laterally to the inflammatory mass. The parts were sponged with hot water, and the tissue included in the forceps was tied off. The wound and cæcum were covered by moist gauze; the appendix was lifted; the cæcum was guarded by the thumb and index-finger of the left hand, and was cut through beneath the base of the appendix by scissors. The perforation was closed by double rows of continuous silk sutures, the first including the serous and muscular layers, the second a continuous Lembert stitch.

Some trouble in returning the bowel (which had been redelivered to control the bleeding) was anticipated, and to avoid any traumatism the wound was enlarged below by scissors guarded by a finger within it. No drainage was used. The wound was closed in the usual manner, and the aseptic dressing applied. The stitches were removed on the seventh day, there being a slight amount of suppuration in the upper portion of the wound. With this exception, the patient made a good recovery and was discharged on the twenty-first day.

Examination of the excised appendix revealed the lesions of chronic interstitial appendicitis.

CHRONIC APPENDICITIS IN RELATION TO PELVIC SYMPTOMS IN FEMALES.

A patient has just been operated upon for the removal of the left ovary and the appendix. She had been subjected to several

vaginal operations for some pelvic trouble. She complained of dysmenorrhœa and left-sided pelvic pain which incapacitated her for work. On deep palpation over Poupart's ligament there was tenderness; on vaginal touch an enlarged left ovary was palpable. An abdominal operation was advised.

The left ovary was enlarged and was removed. The right ovary was the site of small cysts, which were punctured. The appendix was not normal: its distal end was expanded and its proximal end contracted, rendering drainage difficult. It also was removed.

The important fact in this case is that the appendix was an element in the pelvic disturbance. It is more frequently the site of pathological processes than are either the ovaries or tubes.

POST-OPERATIVE INTESTINAL OBSTRUCTION.

A. S., male, white.—Five days ago the patient was operated upon for chronic appendicitis. The appendix was found to be retrocolic and reached high up behind the hepatic flexure of the colon. It was bound to the bowel by dense adhesions. There was no pus. The appendix was removed and the wound was closed, free drainage being provided by iodoform gauze and a rubber tube. The patient took the anæsthetic badly and has vomited persistently since the operation. All of the usual resources and medical treatment have been of no avail. The abdomen appeared normal; on examination there was no evidence of peritonitis. The pulse was good (from 80 to 90). There was no evidence of intestinal obstruction; on the contrary, there was daily passage of flatus. It was decided to reopen the wound, the vomiting being either reflex from the irritation of the iodoform-gauze drain or due to intestinal obstruction.

Operation.—Ether anæsthesia, followed by oxygen inhalations. The patient was in the horizontal position. All stitches were removed; the wound was reopened. The iodoform gauze was soaked with sterile water and the strips carefully withdrawn with the drainage tube; the area enclosed by the gauze was thoroughly cleansed and covered by small gauze strips. The inner edge of the wound was lifted by retractors and four large strips of hot gauze were introduced into the peritoneal cavity and disposed about the area of operation. Examination showed no general peritonitis. The cæcum was ruptured at the point of removal of the

appendix, and faeces escaped through the perforation. The fecal pool was walled in around the cæcum and colon by the coils of the small bowel. The cæcum and a portion of the colon were gangrenous. The coils of the small bowel were adherent to the colon above, and peristalsis was arrested. The cæcum was plugged with a piece of iodoform gauze. The parts were cleansed and washed with bichloride and carbolic acid solution. The adhesions of the small bowel about the colon were freed. Attempt to invaginate the torn cæcum failed, the wall of the gut being too soft to hold the sutures. The desperate condition of the patient, the diseased condition of the bowel, and the narrow field of operation, by reason of the walls of gauze, contra-indicated any attempt at excision and anastomosis. The only course was to bring the gangrenous bowel to the surface of the wound and encourage the formation of a fecal fistula. The wound was thoroughly cleansed. The small gauze sponges were removed and counted. The large strips were removed and replaced by large strips of iodoform gauze disposed about a glass drainage-tube. The gauze was placed beneath and around the cæcum and the adjoining ileum and colon, and all these structures were lifted towards the wound. The bowel was anchored temporarily in this position by forceps, and later by temporary sutures. The gauze was then removed from the lumen of the cæcum and colon. Dry dressings of gauze and cotton were applied and fixed by adhesive strips and by a tailed bandage. The exterior end of the drainage-tube projected out of the bandage. This was lightly packed with iodoform gauze and enclosed by rubber dam. Oxygen inhalations were given. Transfusion of hot saline solution through the left median cephalic vein was already in progress, and was continued when the patient was removed from the operating-table to the rolling bed. The head was depressed. After two thousand cubic centimetres of the salt solution had been given, the pulse showed a good reaction; transfusion was then discontinued.

The *general peritoneal cavity* was not involved in this case. Diffuse septic peritonitis is regarded as non-operable. This statement has been made before and has been criticised. Nevertheless the experience in the German Hospital goes to show that operation in these cases is neither curative nor palliative.

Saline transfusion is most efficient in combating shock in such

operations as this. The quantity of salt solution used should depend on the physiological reaction, as shown by the heart's action and the pulse. Too much may be given. This is indicated by cardiac embarrassment, and may result in sudden death. The temperature of the solution should be 110° F. If great shock exists, the temperature may be 120° F.

Fecal fistula following appendicitis generally results from pressure-necrosis of the colon or cæcum due to a contiguous abscess. In this case there was no abscess, and the necrosis was due to the long-existing chronic inflammation.

Invagination of a large portion of the gut may result in obstruction. In such cases excision and anastomosis are safer.

The *prognosis* is doubtful. The vomiting may now be relieved, the small bowel being freed. If the vomiting ceases and the resistance of the patient continues, there will be recovery with a large fecal fistula. Subsequent operation of excision and anastomosis, or preferably ileocolostomy, may then be done.

The pathological conditions in this case would furnish a most vivid object-lesson to those practitioners who say that they have not seen a fatal case of appendicitis. The ravages of the unchecked and recurring inflammatory conditions should serve as a note of warning in the treatment of early cases.

SURGICAL TREATMENT OF APPENDICITIS.

CLINICAL LECTURE DELIVERED AT LAËNNEC HOSPITAL.

BY A. ROUTIER, M.D.,

Surgeon to the Hospitals of Paris.

GENTLEMEN,—After all that has been said and written about the surgical treatment of appendicitis, I should certainly not have taken up the subject again if I had not been asked to do so by the class, and more particularly by some of you who have already been in wards where it is the rule to temporize in the treatment of acute appendicitis, and who have been surprised and astonished at the results obtained by a method diametrically opposed to that line of action.

To say nowadays that one has remained a radical in the treatment of appendicitis requires a certain boldness; of course, I mean acute appendicitis, since as regards chronic or recurrent appendicitis every one is more or less in accordance.

In March, 1899, in the discussion before the Surgical Society, I furnished the following statistics as ground for my opinion.

In 1897 and part of 1898 I operated in ninety-two cases of appendicitis, with twelve deaths:

	Recoveries.	Deaths.
Thirty-five chronic cases	35	—
Thirty-three acute localized cases, with or without abscesses	32	1
Twenty-four with peritonitis	13	11

Even at that time I brought to bear against the temporizing plan the fear of seeing the lesions grow worse, and besides this fear I spoke of the length of the treatment, of the great loss of time—four, six, and eight weeks—necessary to bring the crisis to an end, and from six to eight weeks during which the patient was kept in bed in order to be operated on, so that an attack of appendicitis lasted at least three months, and often six; and I did not mention

the relapses that occur in spite of rest in bed and of the strictest diet, of which I have heard of several more examples since that discussion.

In spite of that, on account of the great esteem I have for the advocates of temporizing, in my anxiety to cure my patients I wished to see whether I was not mistaken, and I made further attempts with the temporizing treatment, which did not, however, succeed any better than formerly. For this reason I have remained a radical,—that is to say, whenever I have to deal with an acute attack of appendicitis, if I have a free hand I remove the appendix as quickly as possible. The results of this practice can be seen in the following table.

From March 1, 1898, to August 10, 1900, I operated on one hundred and seventy-six cases of appendicitis with nine deaths:

	Recoveries.	Deaths.
90 chronic cases	90	—
9 cases with abscess, without removing the appendix	9	—
24 cases with abscess and removal of the appendix	24	—
2 subacute cases	2	—
14 acute cases	14	—
28 cases with peritonitis	19	9
5 cases with removal at the same time of a pyosalpinx	5	—
4 cases with pyosalpinx and abdominal hysterectomy	4	—
<hr/> 176	<hr/> 167	<hr/> 9

This gives a general average of five per cent. mortality on all the cases. If we subtract the cases operated *à froid* in which I had no deaths, there remain eighty-six acute cases with nine deaths.

I consider the operation *à froid* such a safe one that I have no hesitation when the indication occurs to perform another operation at the same time. Among my ninety cases there are some in which I performed nephropexia at the same time. In another case I did a radical cure of hernia at the same time, in another I removed the appendix and performed hysteropexia, while in still another and by the same incision I removed an ovarian cyst, and all these patients recovered.

In these statistics there are also nine cases which I have put in a separate category,—those where, together with appendicitis, there were suppurative lesions of the adnexa; five times I removed the adnexa and four times the uterus, and these nine patients recovered. In some of these cases a complete diagnosis had been made before the operation; in others I did not see that the appendix was mixed up with the disorder until I was operating, when I removed it. In all cases the appendix showed traces of lesions, but it was not possible for me to know where the trouble began, whether in the adnexa or in the appendix.

But these complex cases, as well as the simple ones in which the inflammation has died out, need not be dwelt on here, since there would be no difference among surgeons as to the best course to adopt.

It is only in connection with the acute cases that opinions differ, and differ very widely, since for a given case some surgeons advise immediate operation, while others refuse to operate, considering the operation more serious than temporizing.

We are all inspired with a single purpose, that of curing our patients; how, then, can we explain these very different lines of action?

In the first place, let me mention another point concerning which I believe we are all agreed; this is the absolute harmlessness of the operation performed during the first hours after the attack begins. I will go even further and say that in the majority of cases the operation is as easy and benign during the first twenty hours as in the majority of operations *à froid*. It is even easier, as there are then never any adhesions.

In the discussion before the surgical society to which I alluded above I mentioned a very remarkable case of this sort in which, operating at midnight on a child whose temperature was 104° F., and whose pulse had been 130 since morning,—that is to say, for about twenty hours,—the temperature of that same child seven hours after the operation was normal and the pulse at 80, and the little patient made an excellent recovery even without drainage.

I can to-day add sixteen other cases to that one,—those that are marked as acute and subacute in my statistics; in all these cases the patient's temperature was high when I operated, often 104°, the pulse rapid, sometimes 140, the abdomen distended, and there

were vomiting and absence of intestinal flatus. There was peritonism, but not yet peritonitis.

In all these cases the operation was perfectly simple, and was performed in a few minutes; in a very few of them I drained, as there was already a little exudation; in all the result of the early operation was remarkable, not only because the patients recovered, but because all the serious symptoms disappeared quickly, the temperature and pulse came rapidly down, the vomiting ceased, the distention subsided, and the intestinal functions began to work again. In a word, these seventeen patients were retained in bed from eighteen to twenty days, of which seventeen to nineteen were without fever.

Now, I ask you to compare these results with those that would have been obtained by temporizing; instead of operating at once, we should have kept the patients absolutely quiet in bed on a diet of water, ice, and opium. Even admitting that in this way the crisis would have been passed through in all these cases, which I think is saying a good deal, how long would the treatment have lasted? The advocates of the temporizing method say that it is best not to operate for four or five weeks after the acute attack; if to this you add that the diet to which these patients are subjected is rather a slim one, you will see that when they reach the moment at which it is safe to operate, they are not physically in a very satisfactory condition.

But this is not the way that matters always go, as the acute phase does not always quietly pass off and relapses are common, so that patients confined in bed on the strictest diet are liable to have new attacks and abscesses.

In spite of my original preference, and I repeat on account of the great esteem that I have for the advocates of the temporizing method, I have given it a fair and rigorous trial, and must confess that I have not been satisfied with it.

In one case, in which the symptoms were subacute and my hand was stayed, I put the patient on the regular temporizing treatment; but on the eighth day, although no change had been made, and the intestine had spontaneously begun to act again, and every one about the patient was rejoicing in the success of the method, the patient suddenly grew worse one night, and in the morning the temperature was 103° F. and the pulse 130. Six hours later I

operated, and found the appendix gangrened and green; there was no abscess, only a little serum, so that I drained and the patient recovered.

But I have a still more typical case to relate to you. Last July I was asked to see two hospital patients, both with acute appendicitis,—a man of thirty-two and a woman of twenty-three,—whose cases were absolutely alike, and with whom the symptoms and signs of the disease were entirely similar.

This was Friday, the 16th of July, and both patients had been seized with violent pain Sunday evening, July 11; in both cases the pain was soon localized to the right side, both vomited, the abdomen soon became distended, and occlusion was complete.

When they entered the hospital on the 16th the abdomen was much distended, pain and resistance predominating to the right, the temperature was 103° F., and the pulse 130. To both of these patients, and particularly on account of the intestinal occlusion, which had lasted since the beginning of the attack, I proposed an immediate operation. The woman, always more courageous than man, accepted at once.

I made my incision to the right, and found the cæcum adherent towards the exterior. I separated the adhesions and found a large abscess filled with foul pus, which I washed out according to my custom, exploring at the same time with my finger to see whether I could not find the appendix. This I fortunately succeeded in doing, and I thereupon removed it; it showed two large patches of gangrene with perforations. I cleaned out the cavity of the abscess and drained, and the patient left the hospital on August 8 entirely cured.

The man refused to be operated on, and was put on a very strict medical treatment of absolute diet, ice on the abdomen, and opium. Overcome by the pain, however, he sent for me again on the 19th, three days later. There was not much change in his condition, the abdomen being still distended, the temperature 103°, and the pulse 120 to 130; he had vomited again, the intestinal occlusion was still complete, and his aspect augured nothing good. If I had only been thinking of my statistics I should have refused to act and should have continued the medical treatment, and that would have been the end of it; but I offered him a last chance of recovery and operated at ten o'clock in the evening. The lesions I found were

altogether similar to those of the case mentioned above and which recovered, but this patient died eight hours after the operation.

I am quite aware that among the temporizers those who open abscesses may say that in such a case they also would have operated at once; to this I reply that the diagnosis of an abscess is not always possible. For my part, and in spite of the large number of cases that I have seen, I am certain that in many cases I am incapable of doing so. I have already stated elsewhere that one finds almost always greater lesions than one expected, and I am still of this opinion; and as regards abscesses in particular, I am sure that, except under the influence of anæsthetics, it is almost impossible to detect them, as the shape of the various collections of pus in the iliac fossa can be perfectly simulated by muscular contraction.

On the 6th of August I was called into the country to see a patient who was dying. He was in the tenth day of an attack of appendicitis, of which the early stages had been very obscure, and when I saw him I thought that he had only a few hours to live, as his tongue was dry, his eyes fixed, the pulse uncountable, with profuse sweats and distended abdomen. I thought his condition so bad that, in agreement with my colleagues, and convinced that chloroform alone would have been enough to kill him, I returned to Paris without doing anything, advising large injections of serum *pro forma*.

I was therefore greatly surprised to be sent for again six days later, and to find him much better; there had been stools with passing of flatus, and he had not vomited again; the abdomen was supple and there was no trace of a localized abscess, so that I advised his physician to wait still longer, especially as at that moment there was really no indication for surgical intervention.

Eleven days later he grew suddenly worse again, with a large increase in his albuminuria (I omitted to say that he had chronic Bright's disease), and he died without it being possible to do anything for him, with the signs of superacute peritonitis.

Am I not right in regretting that I did nothing at my second visit?

The following is another case in which medical treatment did not succeed. I was called last June to see a young woman of twenty-two, who had been ill for four days; she had all the signs of acute appendicitis on the mend; after having had distention, vomiting,

and occlusion, everything seemed better; her temperature had been 102° F. and pulse 130, and they were now only 100° and 106; she was passing flatus and had no more nausea.

In view of these circumstances, and urged thereto by the persons about her, I agreed to wait, and a strict medical treatment was enforced; four days later, however, all the symptoms got worse again. I operated as quickly as I could, but she lived only twelve hours.

I am convinced of two things,—that if I had operated on her four days sooner I could have saved her, and that if, on the other hand, I had kept up the medical treatment she would have died just as the preceding patient did.

This is why I do not believe in temporizing.

Of the one hundred and seventy-six cases on which I have operated, without ever having refused a single one (the case of which I have just spoken was subsequent to my statistics), I have lost nine patients. I have already said that all my operations *à froid* were successful; the nine fatal cases therefore concern patients operated on during an acute attack.

I have already mentioned two of them in which I attribute my failure to temporizing. Here are the others: to begin with, an unfortunate physician (who ought to have understood appendicitis well, since he had sent several cases to me, all of which had undergone operation and recovered) was himself, in July, 1899, taken one Sunday with abdominal pain predominating to the left, for which he took a cold bath, that made it worse. In view of the evident situation to the left, one of his friends, convinced that it was not appendicitis, advised a purgative, which acted well, but the patient continued to grow worse. When I was finally called in on Friday the patient was evidently lost; the abdomen was surprisingly distended, there was fæcaloid vomiting, and all the signs of appendicitis to the left. It was only at his formal request and to satisfy his mind that I operated, convinced that he had no chance of recovery.

The abdomen was full of pus, abscess to the right with appendix gangrened, abscess to the left beneath the sigmoid flexure, pelvis full of pus, and pus in the omentum and in the region above the umbilicus. Death occurred six hours after operating.

Another patient I lost from an abscess of the spleen that oc-

curred twenty days after an operation which had been a very complicated one, but which I nevertheless count among my cases of appendicitis.

A young woman of twenty-seven, who had had a good deal of vomiting of blood two years previously, was seized on October 26, 1899, with violent pain in the abdomen, not localized to any particular region. She was first taken into a medical ward, but was passed into my ward on November 2 with the diagnosis of gastric perforation.

In my uncertainty as to what the trouble was I opened the abdomen on the middle line below the umbilicus. The omentum was red and thickened, and I found on raising it up that it was glutinous; the small intestine was also red and glutinous; reddish serum flowed from the abdominal cavity, and when I came to Douglas's cul-de-sac the serum changed to pus; no adhesions, and I began by washing out the whole abdomen.

The adnexa were healthy, and the appendix when brought to light was red, thickened, and turgid; I removed it and found its mucous membrane full of ecchymoses. The temperature fell, and the general condition became very satisfactory again; for twenty days we thought the patient was saved, but she then had a severe rigor (temperature 102° F.) and pain in her left side. The region of the spleen was manifestly enlarged, so I opened it and found an abscess in the spleen; the patient succumbed a few days later.

I also lost a young girl on whom I operated during an acute attack which it had been found impossible to put a stop to by the temporizing treatment. There had been nothing peculiar in the operation, and twenty-four hours later the condition of the patient and of the wound, which I had drained, were satisfactory; but two hours after a visit that I made, together with her physician, she died, pale and bloodless, and I learned that the dressing which I had seen dry at nine o'clock was soaked with blood at noon shortly after her death, when she was removed from her bed. This girl died evidently of hemorrhage, without it being possible for me to say why or how.

Finally, I lost from peritonitis, which continued after my operation, two patients, a man of forty-one and a woman of sixty-two. I operated on the latter on the sixth day and on the former on the eighth of the appendicitis; in both there was peritonitis when

I operated, and I suppose it is not unfair to say that although I could not save them I did not make their condition worse.

You will have seen from my statistics that I almost always remove the appendix; this naturally is the only way to be absolutely certain of a permanent cure. As I said some time ago in an article on the subject, a surgeon who operates on a case of appendicitis *à froid* should feel morally bound to have the appendix in hand for his patient's inspection when the operation is over. I have always removed it, and have therefore always fulfilled this obligation.

This is not so easy a matter when operating during an acute phase; still, you can see that it is often possible, since, out of my sixty-eight cases of recovery in acute appendicitis, I left the appendix behind only nine times. In two cases I had to make secondary operations in order to get the appendix.

In one of my operations *à froid* my patient, in spite of a very strict diet, several cures at Châtel-Guyon, and a long course of treatment under Abbé Kneipp, had had during three years a great number of attacks of appendicitis, in two of which a surgeon had been obliged to open a large abscess by means of Roux's incision. When I operated, in spite of my aversion to Roux's incision, which in this particular case had been followed by eventration, I passed through the cicatrix, and at the same time made a radical cure of the eventration; my patient recovered, but I can hardly hope, in view of the length of the first incisions, that I can have effected a lasting cure of the eventration.

I have never used Roux's incision; when I speak of it, it is from having seen patients operated on by his process. In my first case I operated on the medial line, with a subumbilical incision, which very much increases the difficulty of the operation, and is only applicable to cases of appendicitis *à froid*; but I soon came to making my incision on the anterior rectus, penetrating into its sheath. I now use this incision in all cases, acute or chronic, and am entirely satisfied with it; it always leads to the cæcum.

In cases of appendicitis *à froid* my incision is not more than three or four centimetres long, and can often be closed with a single suture; so far I have not had a single case of eventration.

I tie the appendix at its base with a double catgut, and the same for the meso-appendix, and then make the section with the

actual cautery, with which I also destroy the mucous membrane of the stump; then I put everything back in place, without further precautions. I have never had a secondary abscess, and consequently never any infection from the stump of the appendix, which some operators carefully bury by means of sutures.

As in all my cases of laparotomy, after having tried the plan of several tiers of sutures, I have returned to the simple suture going through all the layers, usually made with silkworm-gut, or, when the wall is too thick, with silver wire.

In acute cases, whether there is a mass in the iliac fossa or not, I make the same incision, without fear of the peritoneum, which I always open, except in cases when I penetrate into the abscess from the start. The folds of the intestine and the remainder of the peritoneum I protect with sponges or cloths, and I then look for the cæcum, which almost always appears at once and acts as a guide.

If there is neither abscess nor adhesion, the appendix is soon found and removed as though *à froid*; if the peritoneum appears very red, and if there is effusion, I place two drainage-tubes like the barrels of a gun, and pack them in place often with sterilized gauze. If there are adhesions, I separate them to reach the abscess, which I wash with warm serum, to which I add permanganate of potassium if the pus is very offensive.

My left forefinger guides the canula into the abscess and feels for the appendix, and you see from my statistics that I generally find it; I treat it always in the same way, ligating with catgut and removing it with the actual cautery.

In these cases, whether or not I remove the appendix, I insert two or three large drainage-tubes as far as may be necessary, one on each side of the cæcum and the other in the pelvis, and I always pack them in place with sterilized gauze. I act in the same way when I find peritonitis; the appendix is then always accessible, there are no adhesions, and reddish, dirty-looking serum flows out. I then wash the entire cavity until the liquid comes out clear. Formerly I used to make one or two counter-openings, but for some time past I have merely placed very long and very large drainage-tubes in whatever direction may be necessary.

I may mention a drawback to the use of sterilized gauze for draining in cases of suppuration; the odor that then develops in

the dressing in two or three days recalls the dark ages of surgery with poultices, so that on some occasions, in order to avoid this sickening smell, I use iodoform gauze.

The incision that I make in acute cases—as small in the beginning as for other cases—is extended according to circumstances, but is never a long one; I then close it up with one or two sutures, only leaving place for the drainage-tubes, which I remove as soon as possible.

It is perhaps due to the small dimensions of my incision that my operations are so rarely followed by eventration; in two cases, after having been much surprised to see a hernia the size of a filbert, after a year and fifteen months I could no longer find this hernia; but these were children.

I am therefore still a radical interventionist, only regretting that it is not always possible to operate on these cases in the first few hours, as we should then cure them all. If I operate on those that come to me at a later moment, it is in the hope of curing them, and you have seen that even then I frequently succeed. Those of you who have followed the patients in these wards will, I feel sure, do me the justice to admit that my line of conduct has always been guided by the idea of being of the greatest help to those whose lives were intrusted to my hands.

DOUBLE NEPHROPEXY AND INVERSION OF THE VERMIFORM APPENDIX.

CLINICAL LECTURE DELIVERED AT THE NEW YORK POST-GRADUATE MEDICAL SCHOOL
AND HOSPITAL.

BY GEORGE M. EDEBOHLS, A.M., M.D.,

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Gynæcologist to St. Francis's Hospital ; Consulting Gynæcologist to St.
John's Hospital, etc.

GENTLEMEN,—I present to you this morning a case which illustrates very well several important pathological conditions. The woman has bilateral movable kidneys, chronic appendicitis, a tumor of the left ovary, and an enormous ventral hernia due to a diastasis of the recti extending from the sternum to the pubes. In addition, she is nearly two months pregnant. The case will afford me the opportunity to discuss the connection which exists between movable kidney and chronic appendicitis and also between movable kidney and pathological conditions of the female genital tract.

The patient is a woman thirty-one years of age, who has been married eight years and has had two children. Her last child was born about four years ago. She began to menstruate when scarcely twelve years of age. Her menstruation was regular, but rather profuse, and usually lasted from seven to eight days. About two years ago the physician who waited on her in her last confinement repaired a laceration of the cervix and thoroughly curetted the uterus; this put an end to the profuse menstruation and also stopped a leucorrhœa which had lasted for several years.

Almost from the time her menstrual life began she has suffered from practically constant backache. This was bearable during the intervals between the periods, but became very severe the day before menstruation began and continued so as long as it lasted. These painful symptoms were, however, considerably relieved by the oper-

ative measures above mentioned. At the time of that operation her physician noticed that both of her kidneys were freely movable, and the backache was partly attributed to this. These pains in her back were at that time the only symptoms complained of which could be attributed to the movable kidneys. About a year ago, however, she began to develop the classic symptoms of prolapsed kidneys. She suffered from obstinate dyspeptic symptoms that absolutely refused to yield to any treatment, the nervous symptoms became more marked, she was emotional, easily frightened, her appetite capricious, and her mind in that unsettled state incident to highly neurotic conditions. Pain also began to be a marked symptom and was referred to the right and left inguinal regions.

Examination shows that both kidneys are movable to the limit, —some six inches on either side. The uterus is slightly enlarged; the right ovary is normal, but the left ovarian region is occupied by a tumor some ten centimetres in diameter and of rather firm consistency. By palpation the appendix can be felt to be of normal size, though somewhat sensitive to pressure; and instead of being in the collapsed condition characteristic of the normal organ, it gives the sensation of a rounded cord-like mass.

There is also present another condition that somewhat complicates the case and deserves careful attention; this is a diastasis of the recti muscles throughout their entire length from the pubis to the sternum, resulting in an immense ventral hernia. Practically the entire contents of the abdomen, covered only by skin, some fat, and a greatly attenuated fascia, protrude through this opening between the muscles.

Taking all the circumstances of the case into consideration, the following plan of operation seems best. Incisions will be made in both the lumbar regions for the purpose of anchoring the movable kidneys. Through the incision on the right the appendix will be reached, and if found seriously diseased will be removed, but if affected only by a chronic catarrhal condition it will be inverted into the cæcum, after which the right kidney will be anchored. Through the incision on the left the kidney on that side will be anchored, but before doing this an attempt will be made to reach and remove the ovarian tumor through the left lumbar incision. If this be impossible, the tumor will be extirpated at a second operation, a week from to-day.

TECHNIQUE OF NEPHROPEXY.

The incision is made from the twelfth rib to the crest of the ilium along the outer edge of the erector spinæ muscle, the outer border of this muscle being readily located by palpation. The incision is first made through the skin and superficial fat to the latissimus dorsi muscle. After the bleeding-points are caught the incision is carried through this muscle, and then I shall try to reach the outer edge of the quadratus lumborum muscle. Some large arterial branches are usually severed here, and these should be tied with catgut before proceeding further, in order to keep the field of operation clear of blood.

THE ILEOGLUTEAL NERVE.

This is an important structure that a good surgeon, considerate of the welfare of his patient after operation, will avoid severing when making the lumbar incision. If it be severed, a region of paræsthesia, of anæsthesia, and at times of painful dysæsthesia, may develop in the gluteal region. Here is found the nerve running across the upper part of the incision. It is drawn to the outer and upper side, out of the way, and I shall endeavor to deliver the kidney without seriously injuring this nerve. Its presence limits by more than an inch the room I have to work in, but even this limitation is worth accepting for the sake of avoiding the annoying after-symptoms.

TREATMENT OF THE KIDNEY.

I succeed in delivering the kidney through the incision without very much difficulty. I now proceed systematically to remove all the perirenal fat. The lamina fibrosa of the fatty capsule can no longer be depended upon to hold the kidney in position; it has been too greatly stretched ever again to perform this function. All of the perirenal fatty capsule is removed, care being taken as I approach the pelvis of the kidney not to open the peritoneal cavity. It is true that I am going to incise the peritoneum later for the removal of the appendix, but I do not care to enter now. As I strip off the kidney fat it is very easy to explore the pelvis of the kidney and also the upper portion of the ureter, which is clearly exposed to view. The blood-vessels can be seen very well and the renal

artery can be distinguished easily by its pulsation. It would be much easier to remove this kidney than to anchor it. If doing nephrectomy, a ligature would simply be passed around the blood-vessels, and when these and the ureter were tied off, the kidney could rapidly be excised. As the fat is removed towards the hilum of the kidney the peritoneum comes into view. Usually there is a rather clear line of demarcation indicating the reflection of the peritoneum. However, in order to remove the fat without danger to the peritoneum, care must be exercised, the tissues kept on the stretch, and each incision watched.

The vessels that supply the fatty capsules with blood must be carefully caught and tied. They are often of considerable size and bleed rather freely. They may bleed even more profusely after the completion of the operation, while the patient is being stimulated, and may thus give rise to a perirenal hæmatoma. This, besides being a source of great discomfort, adds distinctly to the danger of the convalescence. The effused blood may also become infected and thus occasion serious post-operative complications.

INVERSION OF THE APPENDIX.

In order to get at the appendix I now open the peritoneum at the outer and lower side of the kidney. It is more difficult safely to incise the peritoneum posteriorly than anteriorly. I replace the kidney in the abdomen in order to have it out of the way, and carefully cut through the subperitoneal connective tissue and finally the peritoneum itself. I now draw out the colon, which will be recognized by means of its characteristic bands of muscular tissue, and following one of these down, reach the caput coli. The relations here posteriorly are practically identical with those which serve as a guide in front, though the field of operation is less clear and the approach to the appendix more difficult. Once the cæcum is reached, it is generally not hard to locate the appendix. As was anticipated, this organ is found somewhat chronically congested and with the succulent feel that indicates a hyperæmic condition and swelling of its tissues, especially the mucosa. Its color is somewhat darker than normal, and on careful palpation a series of fecoliths are found occupying its lumen. Under slight pressure these can be made to disappear into the caput coli, but their presence is a sure indication that the appendix is in a pathological

condition. The normal appendix is perfectly able promptly to extrude any small masses of feculent material that may find their way into its lumen. The muscular coat of the appendix functions well in health and keeps the lumen of the appendix perfectly clear; when, however, the muscular layer is infiltrated with inflammatory material it does not act well, its peristaltic movements are interfered with, and thus small masses of material are allowed to accumulate.

I tie off the meso-appendix (which is rather broad in this case) in three portions, and cut between the ligatures and the appendix, leaving enough stump beyond the ligatures to prevent them from slipping off the tissues. I then with scissors remove from the appendix any fat still attached to the organ. The appendix is then carefully emptied of its contents by gentle stripping from its tip towards its opening into the bowel. After this, by slightly dilating the opening into the colon, the appendix is completely inverted into the caput coli. Two stitches are now passed through the lips of the mouth left by the inversion of the appendix, in order to prevent a possible reversion. By means of these sutures I also sew the stump of the meso-appendix down over the mouth of the inverted appendix, giving a neat finish to the work and leaving smooth surfaces which will afford no opportunity for the production of adhesions with their subsequent intestinal complications.

In chronic appendicitis, inversion of either the entire uncut appendix or of the stump of the appendix after amputation is practicable in all cases in which ligation with or without depression of the stump has heretofore been employed. If there be but a chronic congestion of the organ, as in this case, with a catarrhal condition, inversion is the ideal operation, since there is no opening of the intestinal tract and consequently no opportunity for the exit of infectious material from the bowel into the peritoneal cavity. If the whole appendix be pretty uniformly thickened, the entire organ should be inverted without opening its lumen at any point. If unequal thickening or stricture of the appendix with distention of the distal end should prove a mechanical obstacle to inversion of the entire appendix, the stump left after amputation of the distal end should be inverted, without previous ligation. The fecal fistulæ and occasional deaths from leakage following operations for chronic appendicitis in which ligation of the appendix has been

practised might have been averted by inversion of the appendix or of its stump.

Inversion of the normal appendix is so simple a matter, and withal so devoid of danger, that I am prepared to go a step farther and to advocate inversion of the normal appendix whenever, for any reason, the abdomen is opened, provided the site or length of the abdominal incision renders the appendix easily accessible. Under the conditions just stated, some good surgeons advocate ligation and removal of the normal appendix; much more logically can inversion be recommended as contrasted with ligation and ablation.

The operation of inversion of the appendix is not difficult. After the organ is cleanly freed from all surrounding tissues down to its origin from the cæcum, the operator seizes the appendix near its base with thumb-forceps and inverts first the proximal part. The portion inverted is held in by a second forceps, while the first forceps grasps anew another portion and pushes it in after the first, and so on until finally the tip of the appendix is pushed inside the peritoneal mouth. After the inversion is thus half accomplished, proper manipulation will complete the operation without difficulty. Gentle stripping, or milking of the appendix now within the cæcum, in a direction from its mouth towards its free end will soon cause the organ to invert completely into the cæcum. The exact moment of full accomplishment of the inversion is readily recognized by the fingers. Closure of the peritoneal mouth by a few Lembert sutures completes the operation, which can be done in less time than is required to describe it.

I present here a series of four illustrations that show the development of the technique of dealing with the stump of the appendix and with diseased appendices in general.

Fig. 1 shows the original method of dealing with the appendix when, after amputation and ligation, the stump was allowed to project freely into the peritoneal cavity. The danger of this procedure was soon recognized. The giving way or slipping off of the ligature meant a fecal fistula or death from infection, and the free raw ends of the appendix might either permit egress of infectious material through lymph-channels from the bowels or might prove the source of sepsis with serious peritoneal adhesions or even a possible intestinal obstruction. Fig. 2 exhibits the first improvement on the original technique, in which the stump of the appendix

was depressed and covered over by folds of peritoneum, bottling the appendix, so as at once to occlude it from the general peritoneal cavity and at the same time cut it off from the possibility of forming adhesions. Figs. 3 and 4 illustrate inversion of the stump of the appendix without previous ligation and inversion of the entire

FIG. 1.



Simple ligation of appendix; stump free in peritoneal cavity.

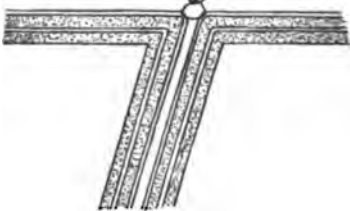
FIG. 2.



Ligation of appendix with depression of stump; stump bottled in a recess of peritoneal cavity.

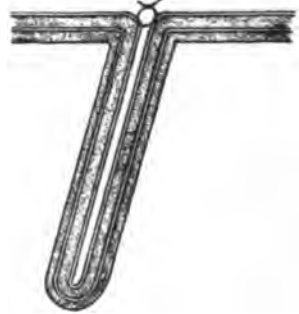
uncut appendix. Inversion of the stump of the appendix was originally performed by Dr. Dawbarn, of New York, over ten years ago,—that is, in April, 1891. Inversion of the entire uncut appendix is original with me, and represents, I think, the climax of advance in the matter of dealing with that organ whenever the conditions are such that the operation can be performed.

FIG. 3.



Inversion of stump of appendix, without ligation; peritoneal mouth closed by suture.

FIG. 4.



Inversion of entire appendix; peritoneal mouth closed by suture.

One decided advantage of inversion of the appendix is that the bowels may be moved at the pleasure of the operator; there need be no delay for assurance against leakage. I have been asked, What becomes of the inverted appendix? Clinical experience has shown that it sloughs off in ten or twelve days and is passed with

the stools. By cutting and ligating its mesentery its blood-supply is completely shut off and necrosis is the inevitable result.

TECHNIQUE OF ANCHORING THE KIDNEY.

Having inverted the appendix and closed the peritoneal wound, I now proceed to again deliver the kidney and to anchor it as originally planned. I nick the proper capsule slightly and then pass along beneath its inner surface a grooved director on which the capsule is incised from pole to pole. The fibrous capsule of the kidney is usually so snugly applied to the underlying kidney substance that it is impossible to cut it directly without cutting more or less deeply into the kidney itself; hence the necessity for the director. In this case the capsule is somewhat thickened, which is in itself a source of suspicion as to the condition of the kidney. If the fibrous capsule be thickened, or if the perirenal fat proves to be unusually adherent to the fibrous capsule, there is good reason to believe that some pathological condition, usually of an inflammatory nature, exists in the organ itself. In this case the kidney has a special interest, because in stripping off the capsule a certain amount of lobulation of the kidney substance is noticed. This represents a persistence of the fetal type of kidney, which, as is well known, is distinctly lobulated.

The fibrous capsule is separated and retracted from the kidney to the extent of about an inch and a half along either side of the incision. Four sutures are then passed parallel to the long axis of the kidney through the retracted capsule, including also that portion of it which is still adherent but not entering the kidney substance. The first suture is inserted on the posterior surface at a point about midway between the upper pole and the pelvis of the organ. The next suture passes in the same manner through the two layers of the capsule proper,—the still adherent and the retracted,—at a corresponding point on the anterior surface of the kidney. Two similar sutures are then in like manner inserted at opposite points half-way between the pelvis and the lower pole of the kidney. It is important that all these sutures should pass through both layers of capsule,—the retracted and the attached layer. None of the sutures embraces any kidney substance.

After passing through the capsule, each end of each suture on the inner side of the kidney is carried back to the edge of the fascia

behind the quadratus lumborum muscle, then through this muscle and the erector spinæ, emerging upon the external surface of the latter. For this a large needle is required. The sutures on the outer side of the kidney are inserted through the relatively thin muscles which form the wall of the loin at this point. After thus suturing, the kidney is suspended at four points. Then the gap in the muscles of the back is closed by suturing them together, the kidney sutures are pulled upon, but very gently, just enough to bring the bared surface of the organ in contact with the raw quadratus lumborum muscle. Upon the union of the raw kidney surface with the raw quadratus lumborum the permanent anchoring of the kidney depends. It is very important that the kidney sutures should be tied without any considerable traction on them, so as not to cut through the fibrous capsule and thus again set the kidney free. The material used in the ligatures that suspend the kidney is catgut so prepared that it will take forty days to be absorbed. This allows ample time for the formation of firm adhesions that will retain the kidney in its anchorage.

On the other side I make the same incision, and proceed as before. Points worthy of notice are the ease with which the patient can be placed in such a position as to afford ready access to the field of operation, and with what facility the kidney is delivered through the wound onto the back. The secret of the easy movement of the patient and the facile delivery of the kidney is found in the use of the kidney air-cushion, an inflated rubber cylinder fourteen inches long and eight inches in diameter, devised by me for use in operations upon the kidney. This readily adapts itself to changes of position and enables one to move the patient with ease, and by evenly distributed pressure upon the front of the abdomen keeps the kidney well in place and easily accessible in the bottom of the wound.

The use of the cushion brings due pressure to bear upon the abdomen so as to push the kidneys under the operator's hand, and the maintenance of anæsthesia is easy in the position that it provides for the patient. The face can readily be turned to one side, and the elevation of the abdomen upon the cushion frees the chest from the pressure of the table. The difficulties often met with in giving anæsthetics to a patient lying prone are practically entirely done away with.

The same condition of affairs exists in this kidney as in the other. The capsule is slightly thickened, and when it is retracted considerable oozing takes place, which, however, will soon cease. After removing the kidney fat an attempt was made to reach the left ovarian tumor through the opening in the peritoneum. The tumor proved, however, to be too far away from the incision and the attempt was given up. After anchoring the kidney and closing the muscular wound in the same way as on the opposite side, the incisions in the loins were closed by means of intracuticular sutures. The patient was in excellent condition, although the operation took nearly an hour and a half. It was deemed advisable, however, to postpone the removal of the ovarian tumor through the anterior incision, because of the difficulty of keeping the wounds and the dressings of the wounds in the loins clean during the washing up preparatory to the performance of an abdominal section.

DIASTASIS OF THE RECTI MUSCLES.

In this case, gentlemen, there is a complete diastasis of the recti muscles. This will necessarily cause a modification of the usual technique in next week's operation for ovarian tumor. Only the skin and fascia remain as the covering of the intestines in the median line, and an incision in this line might result in the failure of primary union. The nutrition of the tissues has been very much interfered with by being overstretched; pressure of the intestines has also lowered the general trophic condition of the cutaneous tissues, and the slightest infection will surely lead to failure of primary union. In this case the tissues might refuse to unite altogether, and I have seen two similar instances in which death took place as the result of such failure. An operation for the radical cure of the extensive hernia is contraindicated by the existing pregnancy.

The incision, then, will not be made through the median line, but through the left rectus muscle. This will enable me to remove the tumor without any difficulty and will at the same time furnish good firm tissues for the healing of the operation wound.

It is possible that the double opening of the peritoneum this morning, or the operation upon the ovary next week, may lead to abortion. Unless some untoward and unexpected complications should occur, however, I do not think that this will happen. Asep-

tic operations upon the peritoneum, if carefully done, by no means involve, as was formerly supposed, a subsequent abortion when the patient is pregnant. Rather extensive operations may be performed upon the genital tract and yet pregnancy go on to term undisturbed.

RELATIONS OF MOVABLE KIDNEY AND APPENDICITIS.

An interesting feature in the present case is the coincidence of chronic appendicitis and movable kidney. This pathological grouping is by no means a mere coincidence. I have had occasion to point out in a series of papers that movable kidney and chronic appendicitis occur so frequently together that there is undoubtedly an etiological connection between them.

Chronic appendicitis, as observed in my clinical and operative work, is present in from eighty to ninety per cent. of patients suffering from severe symptoms due to movable right kidney. This frequency is of itself sufficient to constitute chronic appendicitis, one of the chief, if not the chief, symptoms of movable kidney. On the other hand, chronic appendicitis, because of its frequency, the protracted suffering which it causes, the serious impairment of health which it entails, and the danger of implanted acute attacks of appendicitis, should be considered the most important complication of movable right kidney.

My statistics up to the present time—and they represent a very large number of cases—show that twenty per cent. of all women have one or both kidneys movable; that four per cent. have symptom-producing movable kidney or kidneys; that four per cent. have appendicitis in some form; that while three and one-half per cent. have both symptom-producing movable kidney and appendicitis, only one-half per cent. have appendicitis and well-anchored kidneys. The conclusions to be drawn from these statistics are rather startling. The fact that they are a surprise, however, does not serve in the least to invalidate them.

I may say that satisfactory investigation of the relations of movable kidney and appendicitis became possible only after the discovery and elaboration in clinical work of the method of palpation of the vermiform appendix which I introduced to the profession nearly ten years ago. At the present time any accurate investigation of the relations between the two pathological conditions

that modern research has shown to be so common is only possible to those who are practically familiar with the method of diagnostic palpation of the appendix vermiformis.

Chronic appendicitis may be the only symptom of movable right kidney. Some of the symptoms commonly ascribed to movable kidney are often in reality due to the concomitant appendicitis. The relations existing between movable right kidney and chronic appendicitis are those of cause and effect. This observation is confirmed by the fact that a movable left kidney never produces appendicitis and is only accidentally associated with the condition.

Movable right kidney probably produces chronic appendicitis by indirect pressure upon the superior mesentery vein, the return circulation of the appendix being hampered by compression of the vein between the head of the pancreas and the spinal column. Chronic appendicitis associated with movable kidney shows no tendency to resolution or spontaneous cure, with the restoration of a normal appendix, so long as the right kidney remains movable. The only cure possible under these conditions is by slow progress through appendicitis obliterans until the appendix is got rid of. How many incidental dangers are associated with this obliterating process can readily be comprehended. There is the danger of gangrene and of infection; the appendix is in communication with the bowel, in which are constantly present large numbers of infectious agents. The necessity for operation for the relief of both the movable right kidney and the chronic appendicitis is therefore evident.

In twelve of the cases that I have had under observation in recent years, in which the marked feature was the coexistence of movable right kidney and appendicitis, the appendicitis apparently ended in resolution and remained permanently cured after right or bilateral nephropexy without any attention having been paid to the appendix itself.

Recovery from appendicitis after right nephropexy may only be expected in cases in which the associated chronic appendicitis is of comparatively recent origin. Whenever the appendicitis is of long standing the inflammatory condition will have reached a stage beyond the plastic condition in which absorption of the exudate is yet possible. In a minority only of cases of associated movable right kidney and chronic appendicitis will either nephropexy alone

or appendicectomy alone meet all the indications. The majority of patients require both operations to restore them to full health.

As I have demonstrated this morning, both operations—right nephropexy and appendicectomy or inversion of the appendix—may be simultaneously performed through one and the same lumbar incision extending along the outer margin of the erector spinæ muscle from the tip of the twelfth rib to the crest of the ilium. In most cases it is advisable not to expose the patient to the risk, inconvenience, loss of time, and added incision of a second operation, but to dispose of both pathologic conditions at one time. It takes very little longer to perform both operations at one sitting than is required for the nephropexy alone.

[The week following operation was uneventful. Both lumbar incisions were found healed by primary union, and a cyst of the left ovary seven centimetres in diameter was removed at the end of the week by an incision through the left rectus. The cyst was resected, leaving half of the left ovary, which was healthy, as were both tubes and the right ovary. The previous diagnosis of a uterine pregnancy of about two months was confirmed.]

SOME INTERESTING SURGICAL CASES.

BY PATRICK J. FAGAN, F.R.C.S.I.,

Surgeon to St. Vincent's Hospital, Dublin.

I. CASE ILLUSTRATING THE PATH OF A MAUSER BULLET THROUGH THE CALF OF THE LEG.

GENTLEMEN,—There is one feature in this case well worthy of special consideration,—viz., its illustration of the fact that even in apparently simple cases foreign bodies are often found located in the soft tissues far from their place of entrance. This young man lying in bed before us is a bugler, belonging to the Second Battalion of the Royal Dublin Fusileers, who was wounded in the left leg at the battle of Colenso. The history of the occurrence, as obtained from him by our resident medical officer, Mr. McDonnell, is briefly as follows: Whilst lying on his face in front of the enemy and under a heavy fire, a shell burst close beside him, and at the same time he felt a sharp sting in the upper part of his calf. He thought at the time that he had been struck by a splinter. He first felt the sting, then a numbness came over his leg, and he noticed that he was bleeding. Being unable to get his bandage out of his tunic, he could not stop the flow, and continued to bleed for nearly five hours, when his brother, also of the Dublin Fusileers, found him and bandaged his leg. By this time the pain had quite disappeared, and he experienced no inconvenience until the next day, when his leg felt very sore. He refused to be operated on at the base hospital and was sent home. He was *x*-rayed at Colenso and again at Netley, at the level of the knee,—that is, at the situation of the scar,—apparently with a negative result.

He was admitted to St. Vincent's Hospital, and we made a skiagraph of the lower part of the leg,—i.e., far below the level of the scar. In the lower third of the leg, about one inch above the internal malleolus, is observed a foreign body,—not a splinter of the shell, as was supposed, but a bullet. Looking at the corresponding spot on the patient's leg, you will notice a linear scar an inch and a

half long. That scar was made by Surgeon McArdle, who cut down upon and removed the bullet. This, as you see, is very little stained, very little damaged, and is a Mauser which has travelled obliquely from the popliteal space to near the internal malleolus.

II. LARGE OVARIAN CYSTOMA.

I regret, gentlemen, that I had not an opportunity of showing you this patient prior to her operation. She is greatly changed in size and appearance from what she was when first seen and admitted to the hospital on September 17. She then stated that she had been suffering from dropsy for a long time, and asked if she could be relieved. Most likely I should have believed her statement, and inferred that she had an incurable cardiac, hepatic, or renal disease, had it not been for the expression of her face. This is a point so important that it must never be overlooked. The momentary impression made on me by the expression of her face that day has, I believe, saved this woman's life. I am always endeavoring to inculcate how important it is to study the face, and how subtle a clew to the seat of disease is thereby obtained, perhaps in the twinkling of an eye. If ever a woman's face indicated ovarian disease to anybody, this woman's face did so to me. I determined to obtain her history and to examine her most thoroughly and carefully.

The history she then gave was carefully recorded by Mr. McDonnell. Its salient points were as follows: She was forty-three years of age, unmarried, and had been in perfect health until June, 1899. She then felt a sharp stitch-like pain in her right iliac fossa. This pain passed away in a few hours, leaving her perfectly well until July 15, when the attack recurred, accompanied by vomiting. In October, 1899, she first noticed a swelling in her abdomen, which originated in the right iliac region, but soon filled the whole hypogastrium. The swelling seemed to fluctuate in size: sometimes she could not detect it, but when it reappeared it was unmistakably larger than before, until eventually it occupied the whole abdomen, touching the ensiform cartilage. She suffered no further pain until New-Year's-Day, 1900, when the stitch-like pain returned, this time to remain with her. In June her ankles began to swell, and the swelling gradually mounted up the legs until the small of her back and the lower part of her abdomen

were œdematous. Throughout all this time menstruation was quite regular.

The photograph of her taken on admission, though faulty, shows the prominent malar bones, the depression of the corners of the mouth with the lips firmly closed, the sharp, thin nose, and clearly defined *alæ nasi*. These, together with the expression, are the most prominent features of the *facies ovariana*. The patient was thin,—we might say emaciated; the breasts had disappeared, leaving the nipples prominent; the ribs and bony points throughout were distinctly visible. But by far the most remarkable feature was the great size of the abdomen, above encroaching on the thorax and below falling half-way down on the thighs. The skin over this very much enlarged abdomen was tightly stretched, slightly œdematous in the lower part, and marbled with large blue veins. The abdomen was fixed, not participating in the respiratory movements, absolutely dull on percussion all over except in the flanks, where a thin resonant line existed. To the touch it was yielding, yet elastic; on percussing one side, a thrill could not be made to pass to the other.

I concluded that we were dealing with a large, semi-fluid ovarian tumor, and consulted Mr. McArdle on the advisability of operating. He kindly undertook the task on September 19, I assisting him. A median incision, the scar of which you may observe, was made from above the umbilicus to near the pubes, the tumor was laid open, the gelatinous contents were scooped out with the hands, the adhesions gently broken down from the diaphragm, intestines, abdominal walls, and bladder, the pedicle secured, ligatured, and cut, and the tumor which I show you removed. It is a multilocular ovarian cystoma, sixteen inches long, and weighing forty-eight pounds,—a fair average weight for a five-year-old child. Here is the fimbriated extremity of the Fallopian tube (A); this is a very long fimbria (B); here you observe the parovarium (C), and here the cut pedicle, showing blood-vessels (D). This is the ligament of the ovary (E); here some of the adhesion (F), while this is the most solid mass of ovarian structure. Finally, here is a photograph that I took on the tenth day after operation, showing the scar, the stitches being removed. Our patient has made an uninterrupted recovery.

[The patient was seen by me in April, 1901. She continues in excellent health.]

III. TWO CASES OF VESICAL CALCULUS; A CONTRAST.

I have here two cases of vesical calculus, which I think make a very nice contrast. This fair-complexioned young man is a flax-dresser, thirty years of age. One day about a year ago, without any premonitory warning, while passing water he noticed the stream stop with a snap, and then go on again. This he says has since frequently happened. He next observed that at the end of micturition pain set in, extending from the perineum to the glans, and lasting for about five minutes. Micturition was more frequent than usual, was performed far oftener by day than by night, and was much increased by walking or exercise of any kind. Soon blood mixed with the urine began to make its appearance, the hemorrhage being increased by exercise and disappearing during the night. Six months ago he observed that when going down-stairs he felt the pain at every step. Eventually he could obtain ease only when sitting or lying, any movement causing pain. He stated that on getting up in the morning he felt something falling down within his body, and immediately the pain began. There was no difficulty in passing the sound, and a distinct click was audible on the right-hand side as well as on the left-hand side. This was a very clear history, confirmed by an easy examination, of a simple uncomplicated case of a freely movable vesical calculus. I assisted Mr. McArdle in removing these two uric acid stones, which I now pass round. Mr. McArdle elected to operate by the suprapubic method, and the result, as you see, has been in every way gratifying.

Now let us consider this patient in the neighboring bed. He is a laborer forty-eight years of age. Twenty years ago he had gonorrhœa, and throughout life he has been a heavy drinker of porter.—six pints before breakfast, in all about twelve pints a day. Fifteen years ago he noticed pain, coming on by day or night, not associated with the act of micturition. The pain was felt along the urethra, was very much aggravated by wind passing through the bowels, would sometimes of its own accord stop for months, and was always relieved by drinking ten or twelve pints of porter. Lately the patient began to pass water oftener than usual; the

frequency was more marked at night. The quantity passed was smaller, the stream narrower, and the time spent in the act greater than formerly: three men used to finish in the urinal before he had done. There was much hesitation in starting the stream, with violent trembling all over the body, profuse perspiration, and very severe pain before, during, and after the act. When I first saw him, the pain was constant, and for the relief of it he had to squeeze his penis frequently during the day. This pain became worse on lying down and was particularly aggravated by stepping off the foot-path. He could not micturate in the standing position, but had to bend or sit down. The stream of urine scattered much and wet his trousers. He told me that it never stopped and he never passed blood. Exploration of the urethra revealed in its bulbous portion a stricture that would not allow a No. 5 sound to pass. On examining his bladder per rectum, a very hard craggy mass was detected projecting into the bowel. I consulted Mr. McArdle, who by left lateral lithotomy removed from the post-prostatic pouch this large and very rough oxalate of lime calculus.

Now, gentlemen, you observe that in the first case we had every symptom of vesical calculus, while in this we had none. In the first case these two smooth, freely movable, uric acid calculi were extracted; in this case a single, spiculated, fixed, oxalate of lime calculus was found. In the one case examination was simplicity itself; in the other it was debarred by the stricture. Lastly, for the one suprapubic lithotomy and for the other lateral lithotomy was selected. In only one point do the two cases completely agree,—the result has been equally satisfactory in both.

ACUTE SUPPURATIVE MASTOIDITIS; INGUINAL HERNIA, VARICOCELE, AMPUTATION OF THE SCROTUM; SOME OF THE SEQUELÆ OF THE TREATMENT OF STRICTURE OF THE URETHRA BY RAPID DILATATION.

CLINICAL LECTURE DELIVERED AT THE SYMS OPERATING BUILDING, ROOSEVELT
HOSPITAL.

BY ALEXANDER B. JOHNSON, M.D.,

Assistant to the Attending Surgeon, Roosevelt Hospital, New York.

ACUTE SUPPURATIVE MASTOIDITIS.

CASE I.—When this child was examined under ether with a probe, there was found a deep sinus which extended down to dead bone in the frontal portion of the temporal or mastoid fossa,—we could not tell which. There were two sinuses; these were united by a curved incision running in front of the ear. It was then discovered that the trouble was simply a mastoiditis with necrosis of the mastoid process, and that the mastoid cells were filled with pus. There was a chronic suppurative inflammation of the middle ear, which had caused inflammation of the mastoid cells. The mastoid process was removed, much gouging was done, and the sinuses were cleaned out. The communication with the middle ear was made free. The child has since done well. Immediately after the operation there was a temperature of 105° F.; a child may have that temperature with no serious results. This case is interesting in that these sinuses developed without history of any trouble with the middle ear. A point of much consequence in these cases is that we should remove the entire mastoid process and leave the wound wide open, so that no retention is possible. It was necessary, in this instance, to cut through the entire thickness of the skull to reach the necrosed bone; but that is not dangerous. As I now use the syringe to irrigate with peroxide of hydrogen solution you can see the free communication that has been made.

INGUINAL HERNIA, VARICOCELE, AMPUTATION OF THE SCROTUM.

CASE II.—This man, whom I operated upon one week ago to-day, presented a number of interesting conditions. He had an inguinal hernia on one side, a varicocele on the other, and a relaxed scrotum. He had had the hernia for many years. I did three operations at the same time,—i.e., I operated upon his hernia on one side, his varicocele on the other, and I diminished the size of his scrotum. The hernial wound, as you see, is doing well. This darkened condition of the skin above the line of incision is the result of the prolonged use of a truss. This being the seventh day after the operation, I will take out the skin sutures. The retention sutures were taken out about the third day, because, if left longer, they tend to irritate the skin. This very fine silk produces a very small amount of irritation; catgut causes more, as shown by a red line even when there is no pus present. I cut off a large portion of his scrotum. Before the operation it could be drawn down nearly to the knee. The operation consisted in stretching it tense, then seizing it with a long clamp and dividing the part with a pair of scissors. The wound was made transversely; it may be sewn up vertically or transversely,—it makes no difference. Following all operations of this nature there is a certain amount of swelling of the testis; in this case it is so slight that it can hardly be felt. At this point the veins were sewn together. Here is where this large wound was drained. The wound was so extensive because the scrotum was drawn down with considerable force before it was divided, in order that a large portion of it might be removed.

There can be no objection to doing these three operations at one time, because the patient must lie in bed three weeks on account of the operation for hernia. The scrotal wound was sewn up transversely. All this redundant mass will shrink in time. I think it is very important, in this operation for varicocele, to sew together the divided stumps of excised veins, and thus hold up the testicle and relieve the tension. I am not in the habit of practising the subcutaneous method of tying off the veins, for several reasons. In the first place, I am too timid, for occasionally the vas deferens may be tied off by mistake. One surgeon who tied off both the vasa deferentia was killed by the patient. By employing the open method

the field of operation is fully exposed. As many veins may be ligated as necessary; it is not wise to tie off too many, for fear of atrophy of the testicle from interference with its nutrition; if too few are ligated, the patient is exposed to the risk of having the trouble return. Therefore, although the subcutaneous operation appeals to the patient's ideas of safety, it is on the whole a dangerous method to employ. It is impossible to guard against accidents in operating by the subcutaneous method, nor can the patient be assured of a permanent cure, for many cases so treated relapse. Another advantage of the open method is that it furnishes a natural suspensory bandage for the testicle. When the testicle hangs down, these patients suffer a great deal; if a reef is taken in the veins, the testicle hangs as it should,—high. In this case the scrotum was so very long that I thought it would be a decided benefit to the patient to have it shortened; and now it also acts as a suspensory bandage. In all operations of this character the scrotum should be elevated by packing plenty of gauze under it, for, if not properly supported, the circulation may be interfered with, and the tendency to swelling and œdema increased.

In answer to a question from one of the gentlemen present regarding the case of tetanus in which the antitoxic serum was employed, the symptoms developed so quickly that, in spite of the injection, the patient became rapidly worse, and he was so distinctly ill that I thought it inadvisable to administer chloroform or do anything else; the patient died, although there appeared to be some improvement after the antitoxin injection. As yet, it is impossible to predict what the results of this method of treatment will be in a really severe case of tetanus. Cases which develop rather slowly, and in which the symptoms are not severe, are undoubtedly benefited by the antitoxin. But where the symptoms are grave the question as to the effect of the antitoxin injection is yet *sub judice*. I do not know whether antitoxin is capable of saving a really severe case of tetanus or not. Some cases treated last summer recovered, but they were not of so severe a type as the one you saw here the other day. That case followed a dreadful injury, in which there was a lacerated wound in the perineum and the rectum was torn entirely loose; the patient's upper extremity had also been crushed off at the shoulder-joint; a patient in this condition could hardly survive his injuries.

SOME OF THE SEQUELÆ OF THE TREATMENT OF STRICTURE OF THE URETHRA BY RAPID DILATATION.

CASE III.—This is a case illustrating the unfavorable consequences which may attend the treatment of stricture of the urethra by dilatation. The conditions here presented are the results of rapid, not gradual, dilatation of the urethra. There is a secondary cystitis with ascending infection along the ureter causing suppurative nephritis. These are accidents which sometimes follow the treatment of strictures by dilatation, especially by rapid dilatation. It is very painful to pass two, three, or four large sounds, and there is always danger of cystitis and other complications. It is far better and much less painful to perform internal and external urethrotomy, and drain thoroughly through the perineum. There has never been a case in the hospital here in which division of a stricture was followed by ascending pyelitis; whereas a number of instances of pyelitis have come under observation in cases of stricture which had been treated elsewhere by dilatation, and this is one of them.

The physical signs are not very definite. The patient's urine is moderately purulent. I have not attempted to pass a ureteral instrument. On examining the abdomen there appears a certain amount of tenderness on the left side, but no pain. On the right side it is much more tender and quite tense. When I palpate behind and below the last rib on the right side, with one hand in front, I experience a decided sense of resistance. Even when breathing with open mouth and relaxed abdomen, it is quite difficult to examine the patient; the abdominal walls are too rigid. The muscular rigidity is so marked that I can but indistinctly feel the kidney. Day before yesterday there was a decided tumor in the region of the right kidney, somewhat tender and quite easily made out by pressure posteriorly and anteriorly. It was large, round at its lower end, which was not very painful, and situated immediately in front of the examining hand.

In these cases the condition of the urine is very important. If it is possible to catheterize the ureter by introducing a catheterizing cystoscope, we can then make a definite diagnosis. Perhaps the most important thing to do in every case of this kind in which an operation is contemplated is to learn if there is another kidney

present and what its condition is. That is a question of great importance. If it can be determined that the presumably sound kidney is unsound, it would of course be unwise to operate. The only way to determine this question with absolute certainty is by the use of the catheterizing cystoscope, or by catheterizing directly after the method of Howard Kelly, of Baltimore. Kelly's method consists in passing a straight tube into the bladder and catheterizing the ureter; this is done in the female after first dilating the urethra with a large speculum. The passing of a ureteral catheter in women is a simple procedure. It is necessary to have a head mirror, or an electric head-light; with the patient's pelvis elevated, dilate the urethra and allow the air to rush into the bladder and distend it. Then if light be good, the ureter can be catheterized unless the field of operation is obscured by hemorrhage, or a papillary condition of the mucous membrane of the bladder. In most conditions it is readily done. But it is very difficult to catheterize the ureter of a man. In the first place, it is necessary to use a longer tube. The bladder is filled with six or eight ounces of water, which may become bloody and obscure the view. The instrument must be held in exactly the right position, or else nothing at all can be seen. The telescope which is in the cystoscope distorts to a great extent the conformation of the parts. It requires great dexterity to introduce the cystoscope, to see the ureter and, at the same time, to hold the instrument in place, and to keep the patient quiet. This is a most difficult surgical procedure, and failures are very common. There are few surgeons in New York who will attempt it. The best cystoscope I believe to be Brenner's. It is a simple instrument intended merely for catheterizing the ureters. It is small in size. It has a telescope, through which one sees immediately above it a small point of the catheter sticking out. The catheter goes just above the telescope. The way to use the instrument is to introduce it through the bladder, after washing out the bladder with water, then light up, find the ureter, and pass the catheter. There is this difficulty: you can readily find the mouth of the ureter, for the telescope magnifies it and makes it easily seen; but, having found the entrance to the ureter, you then attempt to introduce a soft silk catheter, and as you push it, it bends on itself. Of course, in patients who have strictures you cannot use this instrument.

Now, having found that one kidney is sound, you are in a

position to operate. There is no objection to catheterizing the unhealthy kidney *after* you have found that the other kidney is sound. This man, unquestionably, has a pyelitis, and probably suppurative nephritis, or a pyelonephritis, following an ascending inflammation of the genito-urinary tract, caused by a stricture. The inflammation was lighted up by the violent use of sounds. I do not think that we should at once do any surgical operation upon his kidney, although his general condition is not bad. We have now a patient in the ward with a condition almost like this, and he is getting well without operation. He had no tumor, but voids a large amount of albumin, with a moderate amount of pus. In a certain number of cases it is best not to interfere. I could not catheterize his ureter because he had a stricture. He is getting well by remaining absolutely quiet in bed. This patient should be placed in bed, and given urotropin or salol or boric acid, attention being paid to his diet, etc., and sometimes, under such measures, the inflammation subsides.

It would hardly be fair to ascribe the condition here present to the improper use of the sound, because no matter how carefully the sound may be used, especially in suppurative processes, an ascending inflammation may result; that is an important point, and should be borne in mind.

STRANGULATED AND GANGRENOUS HERNIA; PRIMARY RESECTION OF THE INTESTINE BY MODIFIED CONNELL METHOD IN CIRCULAR ENTERORRHAPHY OR JOINTING OF THE ENDS.

BY THOMAS H. MANLEY, M.D., Ph.D.,

Professor of Surgery, New York School of Clinical Medicine ; Visiting Surgeon to Harlem Hospital.

GENTLEMEN,—This morning it is my purpose to call your attention to an old and trite subject,—viz., strangulated hernia, a condition which is not very common, but is always serious, and has had in the past a very large mortality.

A late noted American surgeon, Dr. Frank H. Hamilton, as recently as 1880 declared that the mortality from kelotomy for strangulation remained about the same as it was in the past century,—i.e., from sixty to seventy per cent.; and since then it has been stated that the mortality in the London hospitals in operations for strangulation was yet nearly fifty per cent. These statistics are tantamount to a confession that in the surgical therapy of this lesion, at least, neither anæsthesia nor antiseptis has proved of any signal value. That this conclusion is an erroneous one, however, can readily be demonstrated, for the measures now at our command would be impracticable without these agents.

The enormous mortality after operative intervention for strangulation was very largely due to irrational, defective, and incomplete surgical technique in kelotomy. The death-rate has in late years been greatly reduced through the advances made in the surgery of the intestine by investigation and experiments, with the utilization of aseptic methods, on the hollow viscera of the lower animals. Indeed, it may be said without exaggeration that the remarkably rapid evolution of intestinal surgery of late is almost entirely dependent on animal experimentation, and I would earnestly recommend you, as an important preliminary study, not

only to perform kelotomy upon the cadaver, but also to practise it repeatedly on anæsthetized animals.

The chief dangers of strangulation proceed from three sources,—first, those due to the accident itself, the sudden occlusion of the intestinal canal, the agonizing distress, and the exhaustion of the vital powers in typical cases; secondly, they come from violent, repeated, forcible taxis and delay in operating; and, thirdly, from defective surgery by antiquated methods. Formerly so many died after surgical relief was sought that practitioners were loath to commit their cases to the surgeon's knife until all hope of relief from other means was exhausted.

The primary dangers from the strangulation itself are insignificant. It is only when the stenosis is protracted or asphyxia sets in that danger to life is apparent, for the intestine, though not of a firm anatomical organization, resists the effects of trauma to a surprising degree, and as soon as it is released from strangulation all danger is past.

Delay in strangulation, with forcible and repeated taxis, is responsible for more complications and deaths than all other causes combined. There was some justification for this in former times, but there is none at present; for, by an early kelotomy, under proper precautions in skilful hands, little danger exists, and, moreover, simultaneously with the release of the bowel the procedure for radical cure of the hernia may be accomplished. But, if your patient refuse operation, you should warn him of the risks of delay and taxis. A full dose of opium should be administered, the patient placed in bed, and soothing applications laid over the hernial tumor. Moderate and repeated taxis may be tried at intervals for twenty-four hours when the symptoms are not urgent.

It will be well for you not to forget, however, that the symptoms here are sometimes delusive, or, rather, that their absence or indefinite character may lead you to encourage a dangerous delay, as gangrene and perforation may exist, especially in Richter's hernia, with but little pain and no vomiting. Not infrequently the outset of strangulation in elderly people is attended by symptoms so indefinite that it may not be suspected until gangrene or perforation has occurred. In fleshy women a small femoral hernia under a thick layer of fat may be overlooked, and the case mistaken for one of internal obstruction. Happily, since practitioners now

appreciate the importance of early surgery in these cases, when promptly recognized a most gratifying diminution of the mortality after operation is recorded.

The operation for strangulated hernia has undergone vast improvement of late years, and has forever relegated to oblivion the old-time, terribly mortal procedure.

The innate repugnance which all persons feel against any sanguineous intervention for the relief of their bodily ailments will, no doubt, often cause such delay that in many cases we must be prepared to encounter a matting or adhesion of the extruded loop,

FIG. 1.



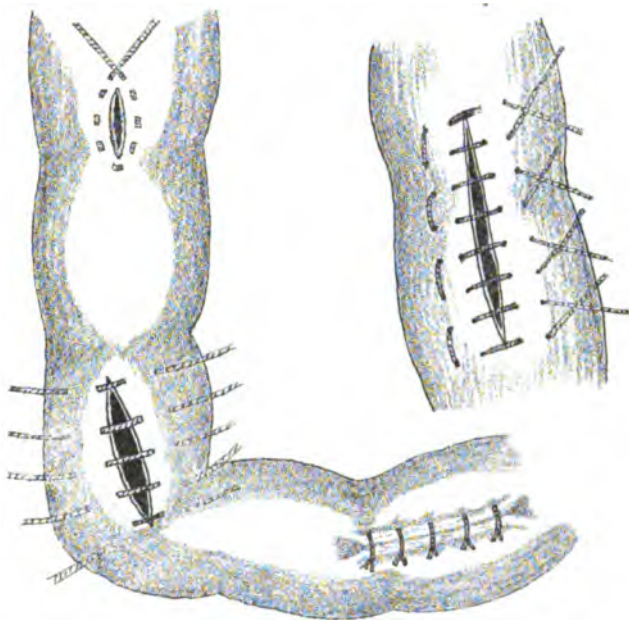
Delivery of intestine, showing gangrenous ring.

a multithrombotic state of the mesenteric vessels, and incipient or advanced gangrene of the intestine, with or without perforation. It is, therefore, obvious that, in order to treat the case on such lines as the existing complications may indicate, whenever we are called, we must respond, prepared for one of three things: first, to liberate the intestine and return it, provided we find it perfectly healthy; secondly, if we encounter a coil or knuckle which is the seat of a limited linear gangrene or ulceration, to resect it and cover in the gap by the Lembert suture; thirdly, if the vitality of the intestine is doubtful or if it is largely or wholly sphacelated, we must

freely resect it and restore the continuity of its lumen. If after we have released the constriction the patient's general condition warns us to complete the operation rapidly, we must leave an artificial anus.

While one might regard an artificial anus as an ideal measure of temporary relief in these grave cases, from a practical standpoint it can be looked upon only as a relic of justly antiquated methods, for it has a large ultimate mortality,—from seventy to

FIG. 2.



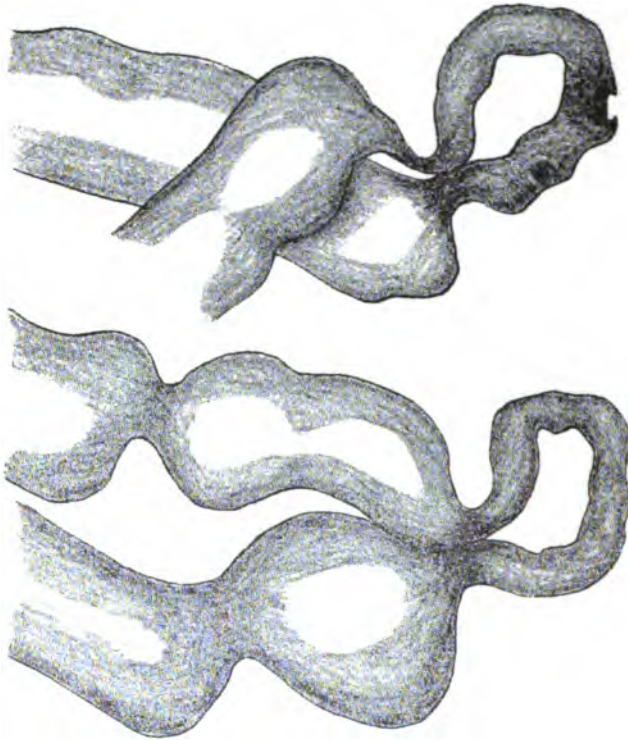
Enterorrhaphy, showing purse-string and Lembert's sutures.

eighty per cent. It is loathsome to the patient, often provokes wide-spread infection, and for its cure requires an operation of greater gravity than a primary resection. It can, then, under no circumstances be viewed as other than a desperate and humiliating resort.

It has been alleged that primary resection is both difficult and tedious at a time when the patient is in no condition to sustain a protracted operation. Experience has shown, however, that patients suffering from strangulation bear operative intervention remark-

ably well when done in a warm room, when no blood is lost, and when the operator is familiar with the technique of intestinal surgery. Moreover, in trained hands, resection and jointing occupy but a few moments and are neither difficult nor dangerous. When we read of one or two hours being occupied in jointing a divided intestine, we may assume that the operator's work is as yet only

FIG. 3.



Showing deformed overdistended coils, extreme stenosis at ring, dusky congested intestine, and gangrene with perforation.

experimental and that he is not yet a master of the necessary technique. The latest statistics on primary resection in gangrenous strangulation show the mortality to be but thirty-five per cent.

I would advise you always to make a large incision from the surface down through all the tissues, freely dividing the constriction. Do no blind cutting. Have no fear of dividing an artery contiguous to the apertures, but be certain that every vessel is

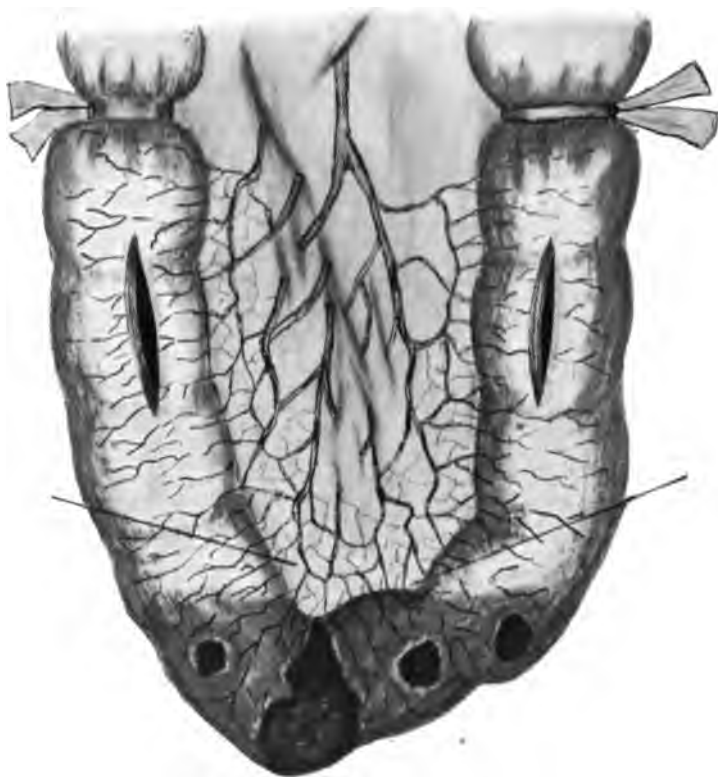


FIG. 4.—Showing oblique divisions of intestine, compression bands tied, lateral openings for joint, and patches of gangrene.

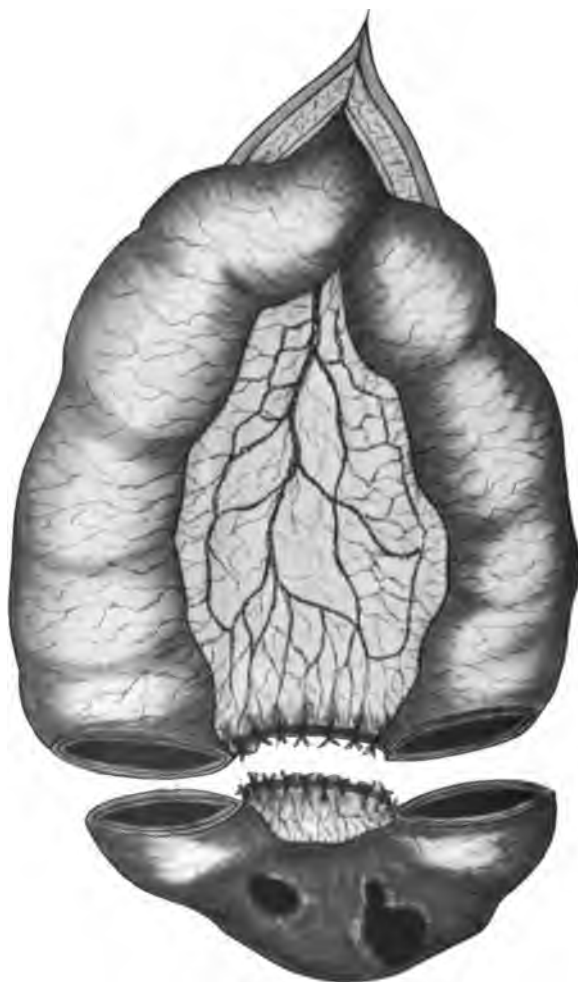


FIG. 5.—Section of gangrenous loop; long oblique incisions from convex to mesenteric borders, on both ends, high up through sound tissue.

securely ligated and that no blood is lost. In opening the sac be careful that none of its contained viscera be wounded. Divide it from the centre of its long axis, in each direction, to such an extent as will freely expose its contents. Now critically examine the intestine, and, if you are fully assured of its vitality, proceed upward and lay widely open the internal ring.

At this stage you will depart from the ancient method of immediately returning the herniated bowel. You will freely draw it down, inspect the seat of constriction, and free all adhesions above the ring as well as below it; then you will gently return the gut and add the simple technique for radical cure. You may now close the peritoneal cavity.

Strangulated hernia derived its great mortality after kelotomy in former times from the improper management of devitalized or gangrenous intestine. More or less gangrene is invariably present in all acute cases within twenty-four hours. In subacute cases it sets in much later. How are we to deal with it? This must depend on its degree and on the state of the patient.

Some say, if we are in doubt as to the vitality of the intestine, we may leave it in the sac after a free division of the site of stenosis. But we should not be in doubt; gangrene is either present or absent. A critical inspection of the intestine will remove all doubt. If the circulation in the walls of the gut has ceased, if the mesentery is the seat of great engorgement and pulseless, if the parts emit a gangrenous odor, and if patches of the bowel are bronzed or black, mortal asphyxia has set in. Hence either an artificial anus or a resection must be made. If you are not familiar with all the essential details of the technique of resection and enteric jointing, from an abundant practice on the cadaver or the living animal, then, by all means, fix the bowel in the wound and make an artificial anus. But except in an extreme emergency no practitioner should undertake a kelotomy for strangulation who is not thoroughly trained in the surgery of the intestine.

Now, assuming that you are in the presence of gangrene of the bowel and have decided to resect, how will you proceed? First, all possible precautions having been made to protect the parts, you will add a laparotomy to your kelotomy,—*i.e.*, you will carry your incision freely up through Poupart's ligament in the male, and through Gimbernat's ligament in the female. This is done in

order that the viscera may be well drawn down and that the bowel after suturing may not be unduly compressed or strained in returning it to the abdomen. You next compress the lumen of the intestine above and below the site of resection. Be careful to go well beyond the gangrenous areas in dividing the gut. Compressive clamps are here quite unnecessary and may be in the way. In my own cases I have employed merely a broad tape of gauze. This is carried through the mesentery and tied, but loosely, lest dangerous pressure be sustained. Its purpose is to control the alimentary current without impeding the circulation in the intestine. The free ends are cut off, the intestine is seized, and we proceed to divide the tissues.

Among the various modes of jointing a divided intestine we have, first, end-to-end or circular enterorrhaphy with the button, plate, or suture. This is the most ancient method, and, with invagination or the use of Lembert's suture, until a very recent date was entirely depended on in jointing the ends of the intestine after resection for any purpose. With the Murphy button as the uniting bond in circular enterorrhaphy we succeed better than with a suture, because the parts are held firmly together until firm union is secured. But a defect remains at the mesenteric junction when the borders are without a direct vascular supply, and leakage, with subsequent peritonitis, often leads to a fatal termination. The modification suggested by Czerny—separate suture of the mucosum—provides well against primary leakage; but, as it entails an additional row of sutures, it further impedes the circulation; besides, it is a tedious, time-consuming process, and in all these cases economy of time is of dominant importance.

Lateral enterorrhaphy or anastomosis has been practised with complete success by various surgeons for different pathological conditions. Its technique involves the application of new principles. First, the ends of the divided gut, instead of being brought into juxtaposition with each other, are inverted and closed by a few interrupted sutures. Secondly, the wall of each intestinal segment is opened and a diverticulum left at either end. Thirdly, the intestinal current, instead of being continued over the united breach through the long axis of the bowel, is projected from one segment into the other.

For a lateral enterorrhaphy the same materials may be em-

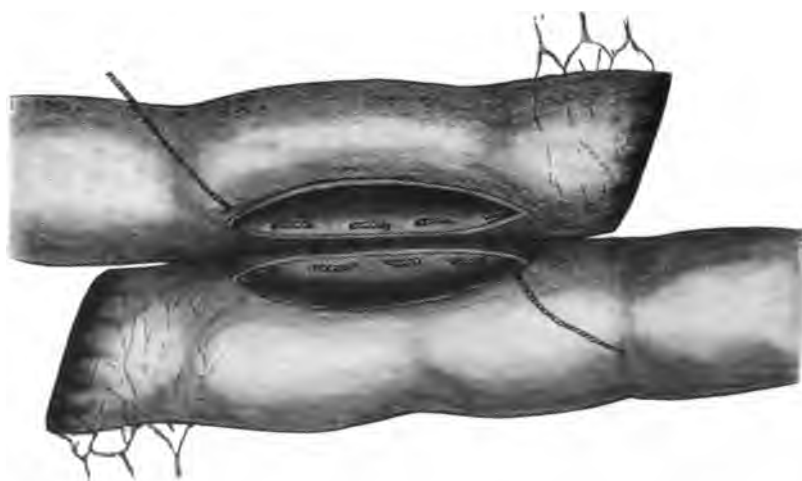
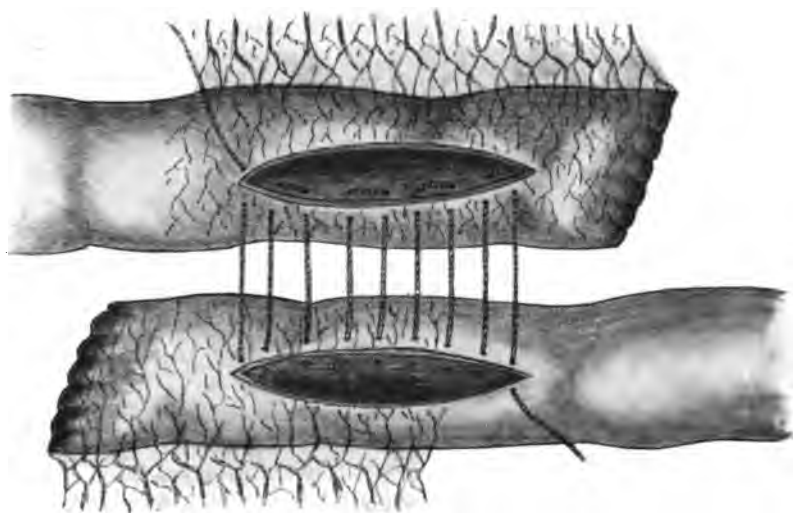


FIG. 6.—Lateral anastomosis. Lower row of sutures in position. Showing longitudinal continuous suture and mesenteric vessels intact to base of divided bowel.

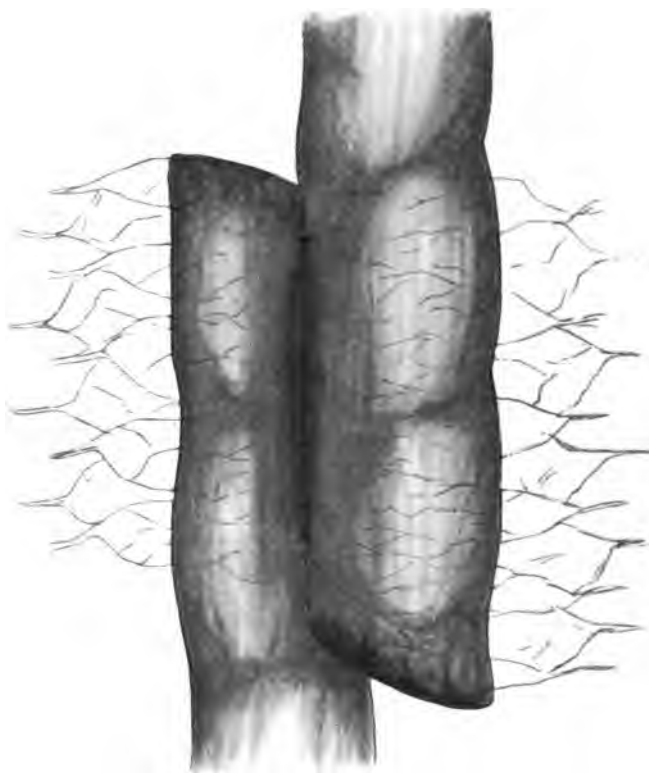
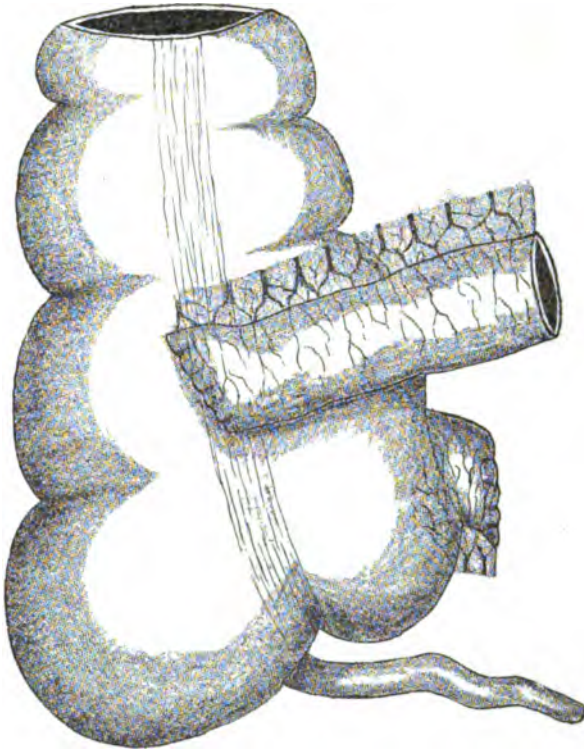


FIG. 7.—Anastomosis complete. Edges of opening inverted. Showing knots of longitudinal silk suture and full vascular supply over traumatized area.

ployed as in the circular method, but my experience has shown that we may laterally joint the intestine more quickly than by end-to-end junction; the mesentery gives us no concern, and, moreover, the inequality in the diameters of the divided intestine is no obstacle, as it always is in ileocolic enterorrhaphy or in uniting a contracted orifice with a widely distended one.

My own experience with lateral anastomosis in gangrenous

FIG. 8.



Ileocecal lateral anastomosis, showing closed ends of ileum.

hernia after resection is limited to two cases, in one of which twenty-nine inches of intestine were removed and in the other nineteen inches; both patients made rapid recoveries and were completely cured; one operation was an ileo-ileo anastomosis and the other an ileocæcal. In both cases a modified Connell's method was used. I will briefly describe this, but in order to become familiar with its technique repeated practice on an animal's intestine is necessary.

Though the suture here applied has been condemned on theoretical grounds, it has in my hands proved all that the author claimed for it, and it stands to-day unrivalled in intestinal anastomosis. It may be applied in a few moments, and it is simple, safe, and secure. With materials found in every household we are prepared to proceed, as only a strong, round needle with a silk thread is required in effecting the bond.

In lateral enterorrhaphy catgut is not to be depended on; we must have some stronger material which will hold the walls of the intestine firmly together when the peristaltic wave begins and the parts are subjected to tension, which is about the third or fourth day after operation.

The Connell is a continued in-and-out suture; it is passed through all the coats of the intestine. Though a continued suture is said to be unsafe in intestinal surgery, because it loosens when the bowel collapses, we can see that after jointing the gut at once fills with fluid and gases and remains distended. It has been further objected that a suture which pierces the mucous membrane of the bowel must become contaminated and every needle-hole later become a fistulous opening. This is another fallacy, without any clinical foundation.

You will observe that in this modified Connell method the cleavage of the intestine is made on a long slope from the convex surface of the gut, in order that its walls may be bountifully supplied by the circulation. The opening in the wall of the intestine for lateral enterorrhaphy should be not less than seven centimetres in length. Having effected a firm lateral anastomosis, we next cleanse and return the bowel. In both of my cases a closure of the inguinal canal by the Bassini method was superadded, but above Poupart's ligament an ample opening was left for drainage, the fold of gauze passing down to the intestine united but not encircling it. In cases thus treated there will be some escape of gases and fecal fluid on the third day; this may continue for a week, to cease finally within a fortnight, when there is consolidation of the wound and the function of digestion is fully re-established.

In conclusion let me briefly recapitulate the advantages of my modification of Connell's method and the great superiority of his suture over others in resection for gangrenous hernia. First, the use of strong silk for the sutures. Secondly, the employment of

the longitudinal, in-and-out, continuous suture. Thirdly, the long-sloped section of the intestine, which ensures a large vascular supply to parts freshly traumatized. Fourthly, a lateral anastomosis instead of a circular enterorrhaphy in all cases.

My patients were both males. One of them was in a desperate condition at the time of resection, and now, four years later, he enjoys the most robust health. In my other case, although I had to carry the divided ileum up and implant it on the cæcal walls beyond the ileocæcal valve, digestion never was better than it is now. I may remind you, however, that this method had been well worked out on the lower animals before I ventured to apply it on man.

Diseases of the Eye and Throat

DIFFERENTIAL DIAGNOSIS BETWEEN PTOSIS AND ORBICULAR SPASM, AND BETWEEN PARALYTIC PTOSIS AND HYSTERICAL PTOSIS.

BY EDMUND LANDOLT,

Consulting Oculist to the Institution National des Jeunes Aveugles, Paris.

DURING the time when Charcot was still among us and I was an earnest assistant at his interesting "evenings," I called the attention of the master to the fact that the differential diagnosis between *paralytic ptosis* and closure of the lids by *spasm of the orbicularis*, a distinction of great importance in nervous affections, could be readily made by observing the patient's forehead. When there is *paralysis of the levator of the upper lid*, the eyebrow is *elevated*, because the patient tries to lift the eyelid by contracting the frontal muscle. Have we not recourse to the same expedient when we try to correct surgically a paralytic ptosis? On the other hand, in *spasm of the orbicularis* the eyebrow follows the contraction of this muscle and *descends* below the normal level.

This observation, so natural to us ophthalmologists, has passed into Charcot's works, and is, I suppose, well known to neurologists. It may not, however, be quite the same with the differential diagnosis between *paralytic ptosis* and *hysterical ptosis*. In distinguishing these I am accustomed to employ the following method.

Suppose a patient whose upper lids are lowered is brought to me. She pretends to be unable to open her eyes. I place her in front of me and tell her to look fixedly at one of my eyes. To do this, she inclines her head strongly backward, so that her gaze may pass under the drooping lids to my eye. Then I put my hand on the top of her head and exhort her energetically to continue to fix

my eye. At the same time I raise her head insensibly; I even incline it gradually forward. If the pupils of the patient remain uncovered during this operation, I have evidently to deal with hysteria; because, to effect this, the lids have to raise themselves, with the eyes, whilst the face is lowered. In fact, keeping the eyes open whilst the head is inclined forward is equivalent to raising the eyes and lids when the head is straight,—a thing absolutely impossible in paralysis of the levator palpebræ, in which the patient ceases to see the object looked at as soon as her head leaves the “compensating position,” because the lids cover the pupil immediately.

SOME OF THE MORE COMMON DISEASES OF THE TONSILS, WITH THEIR SURGICAL TREATMENT.

BY W. CHEATHAM, M.D.,

Professor of the Diseases of the Eye, Ear, Throat, and Nose, Louisville Medical College.

THE unfortunate result in a case reported by Dr. J. A. Stucky, of Lexington, Kentucky, in which a boy fifteen years of age bled to death after having his tonsils removed, induced me to present to you a short paper on the above subject.

It was formerly taught that the faucial tonsils were the only tonsil-like tissue in the throat, but we now know that such tissue commences high up in the pharynx, and, extending down its sides over the base of the tongue to the faucial tonsils, forms a ring of tonsil tissue.

The tonsils are masses of lymphoid tissue covered with mucous membrane, which dips down between collections of cells and forms crypts with secreting surfaces. This tissue in health is of little importance and acts as an absorbing surface; only in disease does it excrete.

The faucial tonsils are subject to numerous morbid growths, especially enlargement, and to carcinoma, sarcoma, papilloma, extragenital chancre, and tuberculosis. Although the tubercle bacillus may be present in non-inflamed tonsils, there are also found the diphtheria bacillus and a coccus similar to the streptococcus pyogenes, staphylococci, and leptothrix, which might necessitate the removal of atrophied or healthy-looking non-inflamed organs.

Enlargements of the tonsils are of two kinds,—the hypertrophic form, which is soft, is found chiefly in children, and consists of an abnormal increase of all the normal elements; and the hyperplastic form, which is hard and occurs in adults; in this variety the increase is in the connective tissue, which may partly strangulate the lymphoid structure.

The bad effects of hypertrophy are mainly mechanical, as it interferes with breathing and deglutition, and produces cough, ear and nose complications, indigestion, quinsy, and systemic symptoms. Mouth-breathing, with its evil results, is a natural consequence of obstruction, and mental and physical development may be impaired as well as the functions of more distant organs.

When the lingual tonsil is the seat of the hypertrophy, there is apt to be cough, dyspnoea, scratching sensations in the throat, hysteria, especially of the globus type, pain and difficulty in singing or talking and in swallowing. In all cases of persistent cough, even in the absence of pulmonary disease and when reflex phenomena are suspected, look to the lingual tonsil.

A very nervous patient is especially liable to reflex disturbances; some deformity of the epiglottis or hypertrophied tonsils may add to the disorder. These conditions are a common cause of nightmare and laryngeal stridor in the young, and serve as a means of entrance for germs of all kinds.

Hypertrophy of the pharyngeal tonsil in the adult causes a sensation of a foreign body, hypersecretion, constant hawking and clearing of the throat with little relief, which is liable to cause relaxation of the Eustachian tube and removal of air from the middle ear. Enlarged faucial tonsils, besides causing mechanical obstructions and other symptoms, may become the seat of chronic abscesses.

Sepsis and free hemorrhage may result from operation, death having occurred from secondary hemorrhage in nine hours after double tonsillotomy with curettage of adenoids.

The chief causes of hypertrophy of the tonsils are frequent inflammation, the lymphatic habit, the rheumatic diathesis, and auto-infection from bad feeding.

As regards treatment, medicine, either local or general, exerts little influence on the truly hypertrophied tonsil; the use of caustics and the cautery is limited, owing to our inability to confine their action, because they are not thorough, and because healthy tissue may be injured, with a resulting slough, followed by secondary hemorrhage or sepsis. The galvano-puncture may be used in small tonsils, those infected with leptothrix and too small to be removed, or in hypertrophy in the adult where there is danger of hemorrhage.

No one instrument, in my opinion, is equal to the Mathieu tonsillotome, as it is easily cleaned, thorough, as painless as any, and can be worked with one hand; but, as a precaution against failure, the surgeon should also be provided with a tonsil knife and a pair of scissors to finish the operation.

If the tonsils are very small or adherent to the pillars of the fauces, they must be pulled out with forceps or a tenaculum or be dissected away.

I seldom remove more than one tonsil at a time, as hemorrhage is always to be feared, and I often prepare my patient for the operation by the administration of iron for some weeks previously.

Local or general anæsthesia is seldom necessary, although, if used, gas is, I think, safer than chloroform or ether.

The chief dangers are sepsis and hemorrhage, but these should not deter us from operating.

Laboratory Methods

THE CLINICAL LABORATORY IN PRIVATE PRACTICE AND IN THE PHYSICIAN'S OFFICE.

BY C. N. B. CAMAC, M.D.,

Visiting Physician to City Hospital, New York City; Instructor in Clinical Pathology, Cornell University Medical College; and Chief of Medical Clinic, Cornell University Medical College Dispensary, New York.

SINCE writing the paper on Hospital and Ward Clinical Laboratories,¹ the subject expressing the title of this paper, and akin to that just mentioned, has occupied much of my thoughts. The suggestion, therefore, of the editor of this journal, that I embody some of these thoughts in an article presented to me a very pleasant task and one which I gladly enter upon.

I. THE LABORATORY ESSENTIAL TO THE CLINICIAN.

It is difficult to explain the unwillingness or negligence of the great majority of physicians to carry out careful yet simple investigations. It is an interesting fact, too, that the laity, by its better instruction in medical matters, is becoming the best guardian and advocate of thorough clinical investigation. The statement that the blood has not been examined is not an uncommon one to be made by a patient. Indeed, the physician cannot afford to be blind to the fact that his patient is quite aware of the omission of anything necessary to the accuracy of his observations. This

¹ Journal of the American Medical Association, July, 1900. As that article was printed without revision of the proof, I would prefer that any one wishing to consult it should apply to me personally for a reprint, which the editor was kind enough to print in proper form.

subject has lately received a refreshing and encouraging word from Sir Michael Foster,¹ who began his labors in pre-laboratory days, but who, unlike many of his contemporaries, has done a vast work in making the laboratory an integral part of medicine. It is, I say, refreshing to find one who attempts to make the pure laboratory man and the pure practitioner co-operate.

II. INSTRUMENTS.

Among the first essentials of the instruments and methods to be used at the bedside are simplicity and immediate practical application. Another essential, equally as important as those mentioned, is that the instruments shall be portable. For this purpose I have devised a clinical apparatus case which has been made for me by Messrs. Eimer & Amend, of Seventeenth Street and Third Avenue, New York City. This case includes everything which may be needed for clinical examination at the bedside. Dr. W. S. Thayer suggested several valuable additions and alterations, which I have adopted; the most important of these is the attachment to the bottom of the case of a simple portable microscope. Dr. Thayer has had this addition made, and the case, while a little larger, is not too large to be conveniently carried. With this case most of the examination can be made directly at the bedside, or else specimens may be taken and examined at the laboratory, and a report rendered in many cases within twelve hours, or at most in twenty-four. Dr. Gettings, in the *INTERNATIONAL CLINICS* for January, 1901, describes an outfit somewhat similar to the one above mentioned.

III. VALUE OF BEDSIDE EXAMINATION.

Too much reliance, however, should never be placed upon the examination of specimens at the laboratory, as an immediate inspection is often of great practical value. It not infrequently happens that a fresh specimen is much more satisfactory than the stain. A man presented himself at the medical dispensary of the Cornell University Medical College at midday in the midst of a typical ague-shake. I immediately examined his blood and found many flagellating bodies. Other forms showed the infection to be multiple tertian. So striking was the condition of the blood

¹ *Scientific Use of Hospitals*, The Nineteenth Century, January, 1901.

that I directed him to return for my class the next day. At half-past nine we failed to find any parasites in the peripheral circulation. On questioning him more closely, I learned that just two hours before he came to the dispensary he had taken thirty grains of quinine; as some of the class had seen the flagellating bodies in the dispensary, I used the case to illustrate the vulnerability of the tertian parasite to adequate doses of quinine, and also the importance of an immediate blood examination during the paroxysm.

Every practitioner is aware of the great value of a careful examination of his cases and of a systematic record thereof; the same may be said of the systematic examination in all branches of clinical diagnosis. On this subject Sir Michael Foster¹ says, "Thus every hospital, and indeed every consulting-room, is in reality, beyond all denial, the seat, day after day, of a continued series of experiments, each conducted for the welfare of the patient who is the subject of them. . . . But while the physician is thus bent on healing the particular sick man who is the subject of the experiment, it is not only permissible for him to make use of the knowledge afforded by the experiment, it is his duty to do so, for this reason alone, if for none other, that the newly gained knowledge makes for the welfare of succeeding patients."

IV. ASSISTANTS IN CLINICAL EXAMINATIONS; RECORDS.

If the practitioner say, "But I am too busy to carry out this kind of work," the suggestion is hereby offered that a special worker be appointed to aid him. As Simon well says, "The man who is thus so busy can afford to support such an assistant." In one of the most prominent consulting-rooms in New York City there is a well-equipped clinical laboratory, with two men busily engaged in the routine examination of office patients. I am not at liberty to mention the name of this practitioner, but I think it can be safely said that he is one of the busiest practising physicians in this section of the country. There is in one corner a small cabinet of records, where all the work of the laboratory is entered in systematic form, and from which valuable information is gathered from time to time for the welfare of the patients and for publication.

¹ Loc. cit.

V. COST OF EQUIPMENT AND MAINTENANCE OF THE OFFICE LABORATORY.

Like a hospital laboratory, the fittings of which I described in my article on that subject,¹ the furnishings of the office laboratory are quite simple and inexpensive. A window with a good exposure should be selected, and a shelf or a table placed there. A plate-glass covering, with green felt beneath, presents a cleanly and satisfactory surface to work upon. If there be a small room adjoining the office, it can be devoted to the laboratory; if not, a screen may be used to partition off that section of the office. A spirit-lamp and a water-bottle are very satisfactory substitutes for gas and running water. The cost of such modest fittings, including the reagents and all that may be needed, is about fifty dollars. This does not, of course, include the microscope, which to-day is as essential to the practising physician as his medical degree. The maintenance of such a laboratory need not exceed twenty-five dollars a year. The return from such an investment can only be calculated by estimating the ability and the conscientiousness of the physician making use of it.

VI. TESTS APPLICABLE IN THE OFFICE AND AT THE BEDSIDE.

The following is a list of the tests applicable in the office and at the bedside.

Blood.—Examination of the fresh specimens. Counting of corpuscles: Thoma-Zeiss apparatus. Hæmoglobin estimation: Talquist's color-book or Von Fleischl hæmoglobinometer. Determination of coagulability: Wright's coagulometer tubes. Dried specimens may be fixed and stained ready for examination in a few minutes, or may be sent any distance to an expert for fuller examination. Specific gravity: Simple urinometer apparatus and benzol and chloroform. Alkalinity: Titration with one-seventy-fifth normal tartaric acid solution. Bremmer's stain for diabetic blood. Widal serum test.

Sputum.—Examination of gross specimen. Examination of specimen microscopically—for Curschmann's spirals, elastic tissue, etc. Staining for tubercle bacilli.

¹ Journal of the American Medical Association, July, 1900.

Fæces and Exudates.—Amœbæ, intestinal parasites and ova, mucus, etc.

Urine.—Albumin, sugar, urea, casts, uric acid and other sediments, gonococci, and tubercle bacilli.

I have not entered into a description of these apparatus and methods, as this would make an extensive article in itself, but refer rather to the admirable text-books of Von Jaksch¹ and Simon.² I have elsewhere³ described very fully the various blood apparatus clinically applicable, together with some of the methods, and take the liberty of here referring to that work, as it is the only one, so far as I know, which deals in detail with these apparatus as applicable at the bedside.

VII. REPORT BLANKS AND METHOD OF FILING THE SAME.

I find the following report blanks useful. They are arranged as a check-book, the stub being a copy of the report. In this way a record of all examinations made in the office is kept:

¹ Clinical Diagnosis, Von Jaksch.

² Clinical Diagnosis, Simon.

³ Apparatus, Methods, and Technique as applicable at the Bedside,—illustrated under "Blood, Pathology,"—Reference Hand-book of the Medical Sciences, vol. ii., second edition.

CLINICAL LABORATORY EXAMINATION.

Name,..... Date,.....

Address,.....

Examination for Dr.

BLOOD.	{	Size	{	Normal ($\mu = \frac{1}{25000}$ of an inch) 7μ			
			{	Microcytes.....			
			{	Macrocytes.....			
			{				
	{	Shape ...	{	Normal.....			
		{	Poikilocytes.....				
		{	Crenated.....				
	{	Color....	{	Normal. Pale yellow.....			
		{	Colorless. Shadow corpuscle.....				
		{	Vacuolated (areas defic. in hæmogl.).....				
Red Blood-	{	Nucleated	{	Normoblasts.....			
			{	Megaloblasts.....			
corpuscles.	{	Number ...	Per cubic millimetre, {	Gowers's.....			
			normal, 5,000,000. {	Thoma-Zeiss.....			
	{		Hyaline body	{	Amœboid.....		
				{	Non-amœboid.....		
		Malarial	Pigmented	{	Intracellular	{	Quarter grown.
						{	Half grown....
						{	Full grown ...
						{	Pigment motile.
			Extracellular	{	Non-flagellating		
					{	Flagellating ...	
				Pigment motile.			
			Segmenting				
		Crescents	{	Pigment motile.			
			{	Flagellating ...			
		Round bodies.....	{	Pigment motile.			
			{	Flagellating ...			
Hæmoglobin	{	Gowers's hæmoglobinometer					
		Specific-gravity method					
		Von Fleischl's hæmoglobinometer.....					
		Oliver's hæmoglobinometer.....					
		Color index					
White	{	Per cubic millimetre, 6,000 to 10,000 normal.	{	Gowers's.....			
				Daland's.....			
				Thoma-Zeiss			
				Oliver's.....			
			Normal,				
Blood-	{	Small mononuclear lymphocyte, 15-28 per cent.					
corpuscles.		Large mononuclear lymphocyte, 6-8 per cent.					
		Transitional lymphocyte, 2-4 per cent.					
		Polynuclear neutrophile, 75-80 per cent.					
		Polynuclear eosinophile, 2-8 per cent.					
		Myelocyte					
		Eosinophilic myelocyte.....					
	Mast-cells.....						

Plates.

Fibrin.

Blood-dust.

Coagulation time { Gross test

{ Wright's coagulometer tubes. Normal, 2-3 min.....

CLINICAL LABORATORY EXAMINATION.

Name, Date,

Address,

Examination for Dr.

SERO-DIAGNOSIS OF TYPHOID..	{		5 min.	15 min.	30 min.	Remark.
		Dilution 1 in 20.....				
		Dilution 1 in 30.....				
		Dilution 1 in 40.....				
		Dilution 1 in 50.....				
		Dilution 1 in 60.....				
		Dilution 1 in 70.....				

CLINICAL LABORATORY EXAMINATION.

Name, Date,

Address,

Examination for Dr.

SPUTUM.

Quantity

Odor

Sediment..... { Quantity.....
 { Appearance

 { Color

Pus..... { Quantity.....
 { Polynuclear neutrophiles

 { Polynuclear eosinophiles

Alveolar cells... { Myelin degeneration

 { Heart-failure cells.....

 { Dust cells

Elastic tissue

Tubercle bacilli

Charcot-Leyden crystals

Curschmann spirals

Diplococci.....

CLINICAL LABORATORY EXAMINATION.

Name,..... Date,.....

Address,.....

Examination for Dr.

SECRECTIONS,
ASPIRATED FLUIDS,
AND FECES.

Source of material for exam.

Pus.

Streptococci

Staphylococci

Gonococci

Diphtheria bacilli

Tubercle

Typhoid

Amœba coli

Mucus

Intestinal parasites

Albumin

Specific gravity

CLINICAL LABORATORY EXAMINATION.

Name,..... Date,.....

Address,.....

Examination for Dr.

GASTRIC
CONTENTS
AND VOMITUS.

Quantity received

Amount of filtrate

Amount of precipitate

Odor

Color

Appearance

Test-meal.

Reaction { Litmus

 { Congo red

 { Tropœolin

Hour admin-
istered.

Free hydro- { Günzburg's reagent (coarse test)

chloric acid { Dimethylamidoazobenzol (delicate test)

Lactic acid.. { Uffelman's reagent

 { Boas test

Hour ex-
tracted

Total acidity ... Decinormal NaHO solution, 4-6 cc. re-
quired for normal contents

Microscopic
poisons.

CLINICAL LABORATORY EXAMINATION.

Name,..... Date,.....

Address,.....

Examination for Dr.

URINE.		Voided
		Catheterized
Gross	{	Amount in 24 hours
		Color
		Sediment, quantity
		Sediment, quality.....
		Specific gravity
Chemical..	{	Reaction
		Albumin { Nitric acid boiling, qualitative.....
		{ Esbach's albuminometer, quantitative
		Sugar... { Fehling's } qualitative.....
		{ Phenylhydrazin }
		Sugar... { Fehling's } quantitative.....
		{ Pavy's }
		{ Roberts's }
		Chlorides
		Phosphates.....
Microscopic	{	Urates.....
		Uric acid
		Bile
		Indican.....
		Acetone
		Diacetic acid
		Diazo reaction.....
		Cylindroids
		Casts—Hyaline
		Granular
		Epithelium
		Blood
		Pus
		Phosphates.....
		Urates.....
		Uric acid
		Bacteriology of.....

The following table, taken from the writer's article on Apparatus and Technique in the Clinical Examination of the Blood, published in the "Reference Hand-book of the Medical Sciences,"¹ will afford ready aid in the interpretation of blood findings.

¹ Loc. cit.

TABLE OF DISEASES THE DIAGNOSIS OF WHICH MAY BE MADE THROUGH THE
THE DISTINCTIVE FEATURES

	Red blood-cells.	Hemoglobin.	Color index.	White blood-cells.	Proportion of red to white blood-cells.	Poikilocytes.	Microcytes and macrocytes.	Degeneration areas and polychromatophilia.
1. Normal blood	5,000,000 to c.mm.	90 to 100 per cent.	1	6,000 to 10,000 to c.mm.	700 to 1	Absent	Absent	Absent
2. Primary anemias.								
<i>A</i> , Chlorosis	4,000,000 to c.mm. normal	Below 80 per cent. reduced	Low	Normal	Normal	Present	Present	Present
<i>B</i> , Pernicious	1,000,000 to 3,000,000 to c.mm.; markedly reduced	Reduced, but above the reduction in red cells	High	Normal	Altered from normal 300 to 1	Present	Present	Present
3. Secondary anemia..	2,000,000 to 4,000,000 to c.mm.; reduced	Reduced in proportion to decrease in number of red cells	Fairly high	12,000 to 15,000 to c.mm.; moderate increase	Altered from normal 400 to 1	Present	Present	Present
4. Addison's disease.. } 5. Hemochromatosis. }	Normal, may be slight anemia	Normal	According to grade of anemia	Normal	Normal	Absent	Absent	Absent
6. Anemia, pseudo-leukemia infantum...	Reduced	Reduced	do.	Greatly increased 100,000 to c.mm.	Altered, 18 to 1	Present	Present	Present
7. Leucocytosis.								
<i>A</i> , Leukemia.								
(1) Lymphatic ...	Normal or slightly decreased	Normal or slightly diminished	do.	Marked increase, 70,000 to c.mm.	Altered, 30 to 1	May be present	May be present	May be present
(2) Spleno-medullary or lieno-myelogenous myelocytic...	Normal or slightly decreased	Normal or slightly decreased	do.	Very greatly increased, 150,000 to c.mm.	May be as low as 1 to 1	May be present	May be present	May be present
<i>B</i> , Inflammatory.								
Polynuclear....	Normal	Normal	do.	Increased 12,000 to 40,000 to c.mm.	Slightly altered	Absent	Absent	Absent
<i>C</i> , Trichinotic, etc.								
Eosinophilic ...	Normal	Normal	do.	Increased	Normal	Absent	Absent	Absent
8. Hodgkin's disease...	Normal. May be reduced	Normal. May be reduced	do.	Normal	Normal	Absent. May be present	Absent. May be present	Absent. May be present

BLOOD. THE CHARACTERISTICS OF EACH DISEASE ARE SHOWN IN THIS TABLE.
ARE MARKED THUS (—).

Normoblasts and giantoblasts.	Small mononuclear lymphocytes.	Large and transitional lymphocytes.	Polynuclear leucocytes.	Eosinophilic leucocytes.	Myelocytes.	Mast-cells.	Plates.	Fibrin.	Coagulation time.	Blood-dust.
Absent	20 to 30 in every 100 leucocytes; 20 to 30 per cent.	6 to 8 in every 100 leucocytes; 6 to 8 per cent.	60 to 75 in every 100 leucocytes; 60 to 75 per cent.	2 to 3 in every 100 leucocytes; 2 to 3 per cent.	Absent	1 in every 400 leucocytes; $\frac{1}{4}$ of 1 per cent.	300,000 to c.mm.	Absent	2 to 3 minutes	Present
Absent	Normal	Normal	Normal	Normal	Absent	Normal	Normal	Absent	Normal	?
Present	Increased 30 to 40 per cent.	Normal	Decreased 50 to 60 per cent.	Normal	Absent	Normal	?	?	?	?
Absent	Normal or decreased in proportion to polynuclear increase	Normal	Increased 75 to 80 per cent.	Normal	Absent	Normal	?	?	?	?
Absent	Normal	Normal	Normal	Normal	Absent	Normal	Normal	Absent	Normal	Present
Present	Increased	Normal	Decreased	Normal	Present	Normal	?	?	?	?
Not present unless anemia exists	Increased 70 to 80 per cent.	Normal or slightly increased	Decreased	Normal	Absent	Normal	?	?	?	?
Not present unless anemia exists	Decreased	Normal	Decreased	Normal	Present	Increased	?	?	?	?
Absent	Decreased	Normal	Increased 75 to 80 per cent.	Normal	Absent	Normal	?	?	?	?
Absent	Normal	Normal	Decreased	Increased as high as 80 per cent.	Absent	Normal	?	?	Normal	?
Absent	Normal	Normal	Normal	Normal	Absent	Normal	?	?	?	?

INDEX TO VOLUME III.

(ELEVENTH SERIES.)

A

Abdomen, phantom tumor of, 180
Abercrombie, John, convulsions in infants and children under three years of age, 90
Albuminuria, pregnancy and, 42
Antitoxic sera, their preparation and standardisation, 23
Appendicitis, prognosis in, 220
 selected cases of, 224
 surgical treatment of, 239
Appendix, vermiform, double nephropexy and inversion of, 250
Asthma, pregnancy and, 43
Ataxia, hereditary cerebellar, 158

B

Baldwin, E. R., selection of favorable cases of pulmonary tuberculosis for sanatorium treatment, 78
Battle, William Henry, remarks on the treatment of bleeders, 82
Bie, Valdemar, phototherapy after Fin-
sen's methods, 1
Bleeders, remarks on the treatment of, 82
Brower, D. E., hereditary cerebellar ataxia; nocturnal epilepsy, 158

C

Camac, C. N. B., the clinical laboratory in private practice and the physician's office, 289
Cardiac disease (pancarditis) due to lead poisoning, 121
Cardioptosis, 105
Cauda equina and conus terminalis, points in diagnosis and surgery of lesions of, 191
Cerebellar ataxia, hereditary, 158
 degeneration due to intestinal intoxication, 177
Cerebral softening, areas of, in both hemispheres, 149
Cheatham, W., some of the more common diseases of the tonsils, with their surgical treatment, 286
Cholera, pregnancy and, 44

Chorea, pregnancy and, 44
Clinical laboratory, 289
Cocaine, spinal use of, 71
Cohen, Solomon Solis, cardiac disease (pancarditis) due to lead poisoning; syphilis of the throat; phantom tumor of the abdomen, 121
Connell method, 274
Conus terminalis and the cauda equina, points in the diagnosis and surgery of lesions of, 191
Convulsions in infants and children under three years of age, 90
Crothers, T. D., clinical treatment of inebriety, 132

D

Deaver, John B., selected cases of appendicitis, 224
Diabetes mellitus, pregnancy and, 46

E

Echinococcus disease combined with tuberculosis, 95
Edebohls, George M., double nephropexy and inversion of the vermiform appendix, 250
Enteric fever, pregnancy and, 46
Enterorrhaphy, 274
Epilepsy, pregnancy and, 47
 nocturnal, 160
Erysipelas, pregnancy and, 48
Exophthalmic goitre, 112
Eyre, J. W. H., antitoxic sera: their preparation and standardisation, 23

F

Fagan, Patrick J., some interesting surgical cases, 263
Fever, enteric, pregnancy and, 46
 relapsing, pregnancy and, 54
Finsen's Institute, 1

G

Gall-bladder and ducts, some acute affections of the, 203
Goitre, exophthalmic, 112
Gonorrhoea and marriage, 58

H

- Heart disease, digitals and, 106
 heredity and, 106
 pregnancy and, 48
 prophylaxis and early diagnosis of, 100
 lesions, valvular, care of, 110
 palpitation, 102
 Hernia, inguinal, 269
 strangulated and gangrenous, 274
 Herring, Herbert T., some results of microbic infection in urinary disease, 215

I

- Inebriety, clinical treatment of, 132
 Influenza, pregnancy and, 50
 Intestinal intoxication, cerebellar degeneration due to, 177
 Intestine, resection of, 274

J

- James, Alexander, a case of exophthalmic goitre, 112
 Johnson, Alexander B., acute suppurative mastoiditis; inguinal hernia, varicocele, amputation of the scrotum; some of the sequelæ of the treatment of stricture of the urethra by rapid dilatation, 268
 Jullien, Louis, gonorrhœa and marriage, 58

L

- Landolt, Edmund, differential diagnosis between ptosis and orbicular spasm and between paralytic ptosis and hysterical ptosis, 284
 Lead poisoning, pregnancy and, 50
 Lillenthal, Howard, some acute affections of the gall-bladder and ducts, 203

M

- Malaria, pregnancy and, 51
 Manley, Thomas H., strangulated and gangrenous hernia; primary resection of the intestine by modified Connell method, in circular enterorrhaphy or jointing of the ends, 274
 Marriage, gonorrhœa and, 58
 mastoiditis, acute suppurative, 268
 Measles, pregnancy and, 51
 Microbic infection in urinary disease, 215
 Murri, Augusto, cerebellar degeneration due to intestinal intoxication, 177

N

- Nephropexy, double, and inversion of the vermiform appendix, 250
 Nervous lesions, localisation of, 164

O

- Orbicular spasm and ptosis, differential diagnosis between, 284

P

- Paraplegia, pregnancy and, 52
 Phantom tumor of the abdomen, 130
 Phototherapy after Finsen's methods, 1
 Pick, Arnold, areas of softening in both cerebral hemispheres, 149
 Pneumonia (acute), pregnancy and, 58
 Poisoning, lead (chronic), pregnancy and, 50
 Pregnancy, influence of, on the prognosis and treatment of coexisting acute and chronic disease, 41
 operations during, 52
 Ptosis and orbicular spasm, differential diagnosis between, 284
 paralytic and hysterical, differential diagnosis between, 284
 Pyrexia, pregnancy and, 41

R

- Reclus, Paul, on the drawbacks to the spinal use of cocaine, and the accidents due to it, 71
 Relapsing fever, pregnancy and, 54
 Rheumatism (acute), pregnancy and, 54
 Robinson, Beverley, clinical aspects of spa treatment, 32
 Roncall, Demetrius, points in the diagnosis and surgery of lesions of the conus terminalis and cauda equina, 191
 Routh, Amand, influence of pregnancy on the prognosis and treatment of coexisting acute and chronic disease, 41
 Routier, A., surgical treatment of appendicitis, 239

S

- Sanatorium treatment of pulmonary tuberculosis, selection of favorable cases for, 78
 Scarletina, pregnancy and, 54
 Scrotum, amputation of, 269
 Sera, antitoxic, preparation and standardisation of, 23
 Serum, antitoxic, in tetanus, 270
 Smallpox, pregnancy and, 55
 Softening in both cerebral hemispheres, 149
 Spa treatment, clinical aspects of, 32
 Surgical cases, some interesting, 263
 Syphilis of the throat, 128

T

- Tetanus, treatment of, with antitoxic serum, 270
 Throat, syphilis of, 128
 Tobacco and heart lesions, 105

Tonsils, some common diseases of, with surgical treatment, 286
 Tubby, A. H., prognosis in appendicitis, 220
 Tuberculosis, a case of combined echinococcus disease and, 95
 in pregnancy, 56
 pulmonary, selection of favorable cases of, for sanatorium treatment, 78
 Tumor, phantom, of the abdomen, 130
 Typhus fever, pregnancy and, 57

U

Urethra, stricture of, 271
 Urinary disease, microbic infection in, 215

V

Varicocele, 269
 Vermiform appendix, double nephropexy and inversion of, 250

W

Walsh, James J., prophylaxis and early diagnosis of heart disease; palpitation and organic disease; tobacco and heart lesions; cure of heart lesions, 100
 Wiener, Alfred, localization of nervous lesions, 165
 Withington, Charles F., a case of combined echinococcus disease and tuberculosis, 95

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